GE
Industrial Solutions

WORLDWIDE PARTNER

SecoRMU

36kV
Gas Insulated Ring Main Unit

Leading the future of electrification

GE imagination at work

GE

GE is a diversified organization covering a myriad of market segments, including infrastructure, finance and media. From energy, water, transportation and health to access to money and information, GE serves customers in more than 100 countries and employs more than 300,000 people worldwide.

The company traces its beginnings from Thomas A. Edison, who established the Edison Electric Light Company in 1878. In 1892, a merger of Edison General Electric Company and Thomson-Houston Electric Company created the General Electric Company. GE is the only company listed in the Dow Jones Industrial Index today that was also included in the original index in 1896.

Industrial Solutions

GE Industrial Solutions, a division of GE Energy Management, is a global leading provider in power distribution, offering a wide range of services and products which include medium and low voltage power distribution equipment and components, motor & control systems and service products that are safe, reliable and offer high performance.

Honour

FORTUNE WORLD'S MOST ADMIRED COMPANIES 2011
Industry Champion – Ranked #1
2011 World's Most Admired Companies

Interbrand Creating and managing brand value™
2011 Best Global Brand

FINANCIAL TIMES
2008 World's Most Respected Companies

BusinessWeek
2010 World's Most Innovative Companies

BARRON'S
《BARRON'S》
2009 World's Most Respected Companies

36kV
New Compact Gas Insulated Ring Main Unit

Leading the future of electrification

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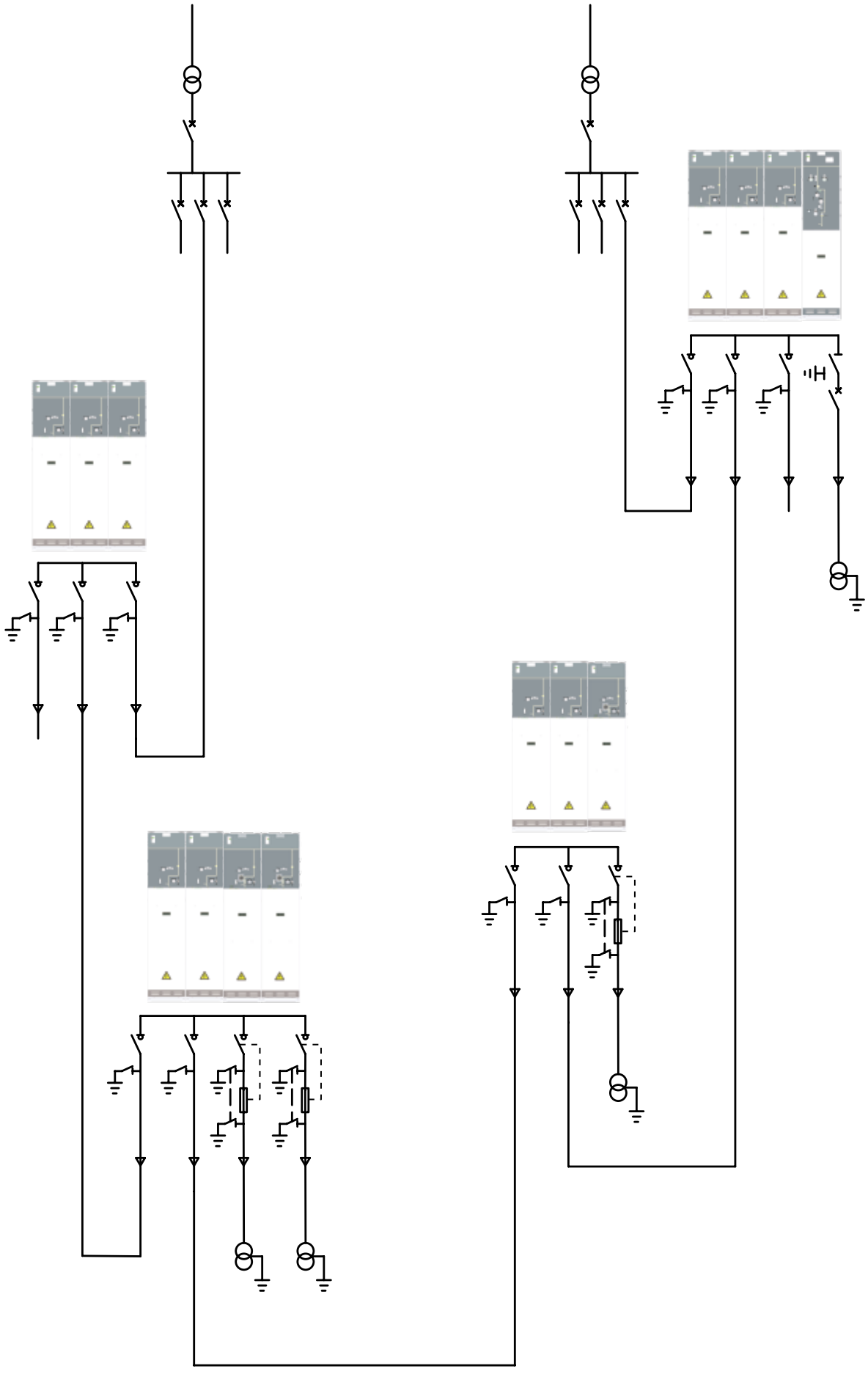
SecoRMU

36kV New Compact Gas Insulated Ring Main Unit

Applications

There are many advantages of a ring type power system topology over a radial type distribution system. With the use of Ring Main Units (RMUs), power supply recovery can happen very quickly if any failure occurs in the power distribution system. It provides great contribution for improving power system reliability and availability. Meanwhile, gas insulated ring main units are compact, safe to use, independent of ambient environment influence, and convenient to install. The 36KV SecoRMU is such a kind of ring main unit, which is especially suitable for kiosk substation applications.

With the features of a completely sealed gas tank, a flexible modular panel design, extendable from both ends, the 36kV SecoRMU provides integrated solutions for most switching applications in wind farm, mining, compact secondary substation, commercial center and industry. The extendable feature allows customer to build functional module units into various solutions to suit their requirements.



Operating Conditions

Normal operating conditions

The switchgear is fundamentally designed for the normal service conditions for indoor switchgears to IEC 62271-1.

- Ambient temperature
  Maximum: +40℃
  Minimum: - 25℃
  Daily average maximum temperature +35℃
- Humidity
  Daily average relative humidity: ≤ 95%
  Monthly average relative humidity: ≤ 90%
  Daily average vapor pressure: ≤ 2.2 × 10-3MPa
  Monthly average vapor pressure: ≤ 1.8 × 10-3MPa
- The maximum site altitude is 1000m above sea level
- The ambient air is not significantly polluted by dust, smoke, corrosive and/or flammable gases, vapours or salt. The manufacturer will assume that, in the absence of specific requirements from the user, there are none.
- Electromagnetic interference in the secondary systemshall be less than 1.6kV

Special operating conditions

In accordance with IEC 62271-1, the manufacturer and end-user must agree on special operating conditions which deviate from operation under normal conditions. The manufacturer/supplier must be consulted in advance if special severe operating conditions are involved. Such as:

- Altitude above 1000m
- Ambient temperature higher than +40℃ or lower than -25℃
- Avoid corrosion in control room or other hazards in the following areas. Install anti-condensation controller and heater if required.
  -High humidity areas
  -Large temperature difference or fast fluctuation areas

Application

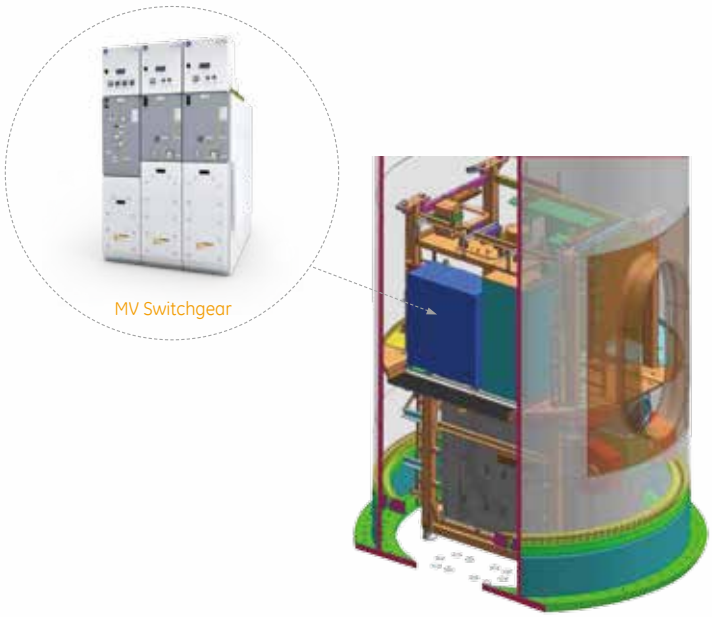
Features and Benefits

Safe and Reliable

- Both the gas tank and cable compartment are internal arc classified (AFLR 20kA/1s), ensuring maximum personal safety. When an internal arc fault occurs, the pressure relief device will open, allowing the pressurized gas to flow via the arc duct away from the operator
- All the high voltage live parts are fully sealed in the gas tank and free from environmental impacts. Therefore, SecoRMU is suitable for use under severe operating conditions with the primary live parts remaining maintenance free
- Panel connected together without any clearance between them, which protects the switchgear against the harmful effects of dust, water, solid foreign objects etc., realize high reliability
- Successfully proven by 500 hour salt fog test suitable for highly corrosive environments
- SecoRMU is equipped with reliable mechanical and electrical interlocking system. Castell and Fortress key interlocking solutions are also available, guarantees safety of personnel, safety of equipment, and continuity of operation

Compact Design

- An optimized electric field design combined with excellent insulating performance, results in a compact switchgear product that operates safely and reliably
- Existing switchgear rooms can be used more effectively
- Suits application in very compact areas



Very Low Maintenance

- Heat loss (I^2R) is mainly caused by circuit resistance. The main circuit resistance of SecoRMU is small resulting in low heat losses and less thermal stress on the equipment
- The 3mm thick stainless steel gas tank is manufactured by laser cutting and laser welding process. Its sealing is systematically checked by automatic helium leakage detection process, ensuring less than 0.1% annual leakage rate
- Very low maintenance and operation cost, resulting in a lower total cost of ownership

Modular design Extendable and Combine Freely

- The basic functional modules being the load break switch panel, switch-fuse panel and circuit breaker panel have uniform width (440mm). Convenient for system design, flexible replacement and upgrading
- Each unit can be extended to the left or right
- Joined together by plug-in busbar connectors and the modular nature of the panel ensure ease of installation and extension without the need for extra gas handling activities on site
- The big cable compartment also ensures a convenient cable installation and connection

Environmental, Health and Safety of Materials

GE has strict process to ensure regulations for the environment, health and safety of materials used during product design and manufacturing are observed. Only re-usable and/or recyclable materials are used in producing SecoRMU switchgear. It reflects GE's commitment to environmental challenges while delivering valuable products and services to the customer

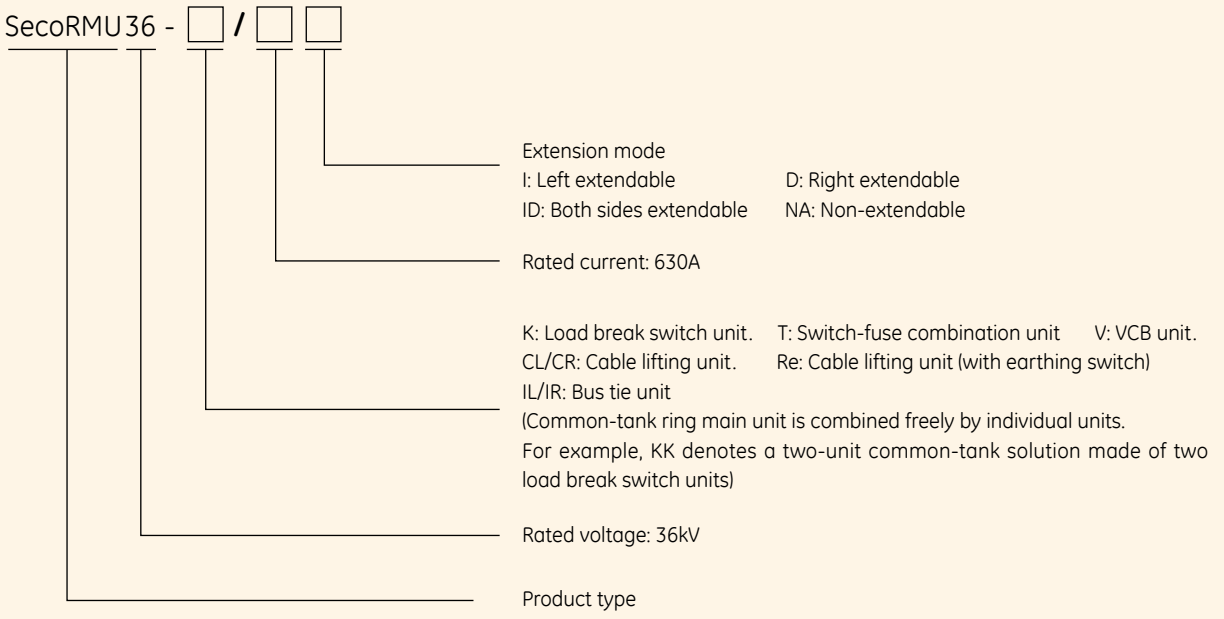
Standards

36kV SecoRMU is manufactured and tested in accordance with the latest version of:

IEC 60282-1	High-Voltage Fuses –Part 1: Current-limiting fuses
IEC 60265-1	High-voltage switches – Part1: Switches for rated voltages above 1 kV and less than 52 kV
IEC 60376	Specification and acceptance of new Sulfur Hexafluoride
IEC 60529	Degrees of protection provided by enclosures (IP code)
IEC 62271-1	High-voltage switchgear and controlgear - Part 1: Common specifications
IEC 62271-100	High-voltage switchgear and controlgear – Part 100: Alternating-current circuit-breakers
IEC 62271-102	High-voltage switchgear and controlgear – Part 102: Alternating current disconnectors and earthing switches
IEC 62271-103	High-voltage switchgear and controlgear – part 103: Switches for rated voltages above 1kV up to and including 52kV
IEC 62271-105	High-voltage switchgear and controlgear – Part 105: Alternating current switch-fuse combinations
IEC 62271-200	High-voltage switchgear and controlgear – Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1kV and up to and including 52 kV

All other corresponding IEC publications, national or local safety regulations must be followed during the installation and operation of the switchgear. In addition, any project specific advice from GE must be considered.

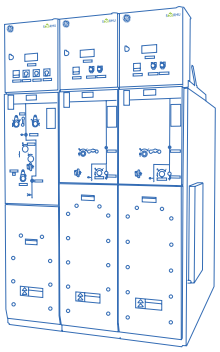
Product Type


SecoRMU 36 - □ / □ □
Extension mode
I: Left extendable
D: Right extendable
ID: Both sides extendable
NA: Non-extendable
Rated current: 630A
K: Load break switch unit.
T: Switch-fuse combination unit
V: VCB unit.
CL/CR: Cable lifting unit.
Re: Cable lifting unit (with earthing switch)
IL/IR: Bus tie unit
(Common-tank ring main unit is combined freely by individual units.
For example, KK denotes a two-unit common-tank solution made of two load break switch units)
Rated voltage: 36kV
Product type

For example:
SecoRMU 36-V/630ID is a vacuum circuit breaker unit with 36kV rated voltage and 630A rated current, both sides extendable.
SecoRMU 36-KK/630D is a two-way common-tank ring main unit, made of two load break switch units, with 36kV rated voltage and 630A rated current, right side extendable.

Switchgear Technical Data

Item		Unit	Load Break Switch Unit	Switch-Fuse Combination Unit	Vacuum Circuit Breaker Unit
Rated voltage		kV	36	36	36
Rated power frequency withstand voltage (1min)	To earth/phase to phase	kV	70	70	70
	Across isolating distance	kV	80	80	80
Rated lightning impulse withstand voltage	To earth/phase to phase	kV	170	170	170
	Across isolating distance	kV	195	195	195
Rated frequency		Hz	50	50	50
Rated current		A	630	Limit by fuse (630A for main busbar)	630
Rated short circuit breaking current		kA		31.5	20
Rated short circuit making current(peak)		kA	52	82	52
Rated short time withstand current and endurance time		kA/s	20/3		20/3
Rated peak withstand current		kA	52		52
Load breaker switch rated active load breaking current		A	630	630	
Load breaker switch rated closed loop breaking current		A	630		
Load breaker switch 5% rated active load breaking current		A	31.5		
Rated cable charging breaking current		A	50		50
Rated earth fault breaking current		A	150		
Rated cable- and line-charging breaking current under earth fault conditions		A	86		
Mechanical endurance (LBS/ES)			5000/2000	3000/2000	
Mechanical endurance (VCB/3p switch)					10000/2000
IP degrees			IP67/IP4X	IP67/IP4X	IP67/IP4X
Internal arc degree	Gas tank		AFLR 20kA/1s		
	Cable compartment		AFLR 20kA/1s		
Gas System					
Insulated gas			SF_6		
Annual leakage rate			≤ 0.1%/Y		
Rated gas pressure (rel, 20˚C)		MPa	0.04	0.04	0.04
Alarm low pressure (rel, 20˚C)		MPa	0.03	0.03	0.03
Minimum operating pressure (rel, 20˚C)		MPa	0.02	0.02	0.02
Auxiliary Circuit					
Rated voltage of auxiliary circuit		V	24/48/110/220 DC 110/230/240 AC		
1 min power frequency withstand voltage of auxiliary circuit		kV	2		



Basic Functional Module Units

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Switch-Fuse Combination Unit (T Unit). 12

Vacuum Circuit Breaker Unit (V Unit). 13

Bus Tie Unit (I Unit) 14

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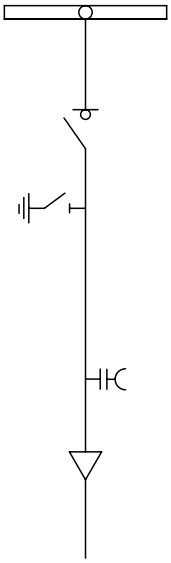
Basic Functional Module Units

Load Break Switch Unit (K Unit)



K

Dimensions:

Width: 440mm

Depth: 920mm

Height: 1950mm

Weight: 300kg

Function

- Connect or disconnect the incoming/outgoing cable with the main busbar
- Earthed three-phase cables
- Making short circuit current

Standard configuration

- Two-position load break puffer switch and separate earthing switch
- Manual operating mechanisms with two separate operating shafts for load break function and earthing function
- Switch position indication for load break switch and earthing switch
- Potential indicator
- SF_6 gas pressure meter
- Interlocking between the earthing switch and the cable compartment door
- Main busbar/feeder busbar/earthing bar
- Cable bushings horizontal in front
- Operating handle

Optional Features

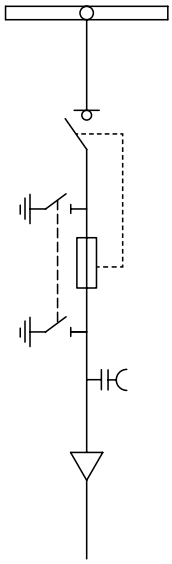
- No earthing switch
- Motorized operating mechanism of load break switch
- Ring CT
- LV compartment
- Cable terminals
- Surge Arrester
- Short circuit and earth fault indicator
- Auxiliary contacts for load break switch position 3NO+3NC
- Auxiliary contacts for earthing position 2NO+2NC
- Main busbar left/right out-cone bushing
- Castell or Fortress key interlock

Technical Data

Load break switch		SecoLBS-K 36
Rated voltage		36kV
Rated frequency		50Hz
Rated power frequency withstand voltage (1min)	To earth/phase to phase	70kV
	Across isolating distance	80kV
Rated lightning impulse withstand voltage	To earth/phase to phase	170kV
	Across isolating distance	195kV
Rated current		630A
Rated active load breaking current		630A
Rated closed loop breaking current		630A
5% rated active load breaking current		31.5A
Rated cable charging breaking current		50A
Rated earth fault breaking current		150A
Rated cable- and line-charging breaking current under earth fault conditions		86A
Rated short circuit making current (peak)		52kA
Rated short time withstand current and endurance time		20kA/3s
Electrical Endurance		E2
Mechanical endurance		5000 times
Earthing Switch		**SecoES 36**
Rated voltage		36kV
Rated power frequency withstand voltage (1min)		70kV
Rated lightning impulse withstand voltage		170kV
Rated short circuit making current(peak)		52kA
Rated short time withstand current and endurance time		20kA/3s
Mechanical endurance		2000 times

Basic Functional Module Units

Switch-Fuse Combination Unit (T Unit)



T

Dimensions:

Width: 440mm

Depth: 1000mm

Height: 1950mm

Weight: 400kg

Technical Data

Switch fuse combination		SecoLBS-T 36
Rated voltage		36kV
Rated power frequency withstand voltage (1min)	To earth/phase to phase	70kV
	Across isolating distance	80kV
Rated lightning impulse withstand voltage	To earth/phase to phase	170kV
	Across isolating distance	195kV
Rated current	Main busbar	630A
	Switch fuse combination	*
Rated short circuit breaking current		31.5kA
Rated active load breaking current		630A
Transfer Current		750A
Mechanical endurance		3000 times
Earthing Switch		**SecoES 36**
Rated voltage		36kV
Rated power frequency withstand voltage (1min)		70kV
Rated lightning impulse withstand voltage		170kV
Rated short circuit making current(peak)		52kA
Rated short time withstand current and endurance time		20kA/3s
Mechanical endurance		2000 times

Function

Control and protect transformers up to 2000kVA.

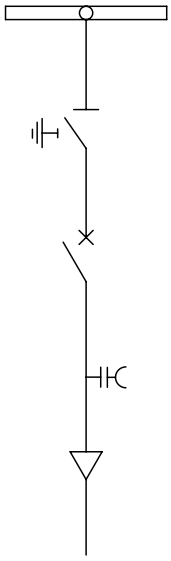
Standard configuration

- Fuse/transformer rating: 36kV, max 63A fuse-links
- Two-position load break puffer switch and separate upstream earting switch mechanically linked with downstream earthing switch
- Manual operating mechanisms with two separate operating shafts for load break function and earthing function
- Fuse holder for DIN type fuse-links. Only accessible when earthing switch is closed
- Fuse tripping arrangement
- Switch position indication for load break switch and earthing switch
- Fuse trip indication
- Potential indicator
- SF_6 gas pressure meter
- Interlocking between the earthing switch and the cable compartment door
- Main busbar/feeder busbar/earthing bar
- Cable bushings horizontal in front
- Operating handle

Optional Features

- Motorized operating mechanism of Load Break switch
- Opening coil
- Ring CT
- LV compartment
- Cable terminals
- Surge Arrester
- Short circuit and earth fault indicator
- Auxiliary contacts for load break switch position 3NO+3NC
- Auxiliary contacts for earthing position 2NO+2NC
- Auxiliary contacts for fuse blown 1NO
- Main busbar left/right out-cone bushing
- Castell or Fortress key interlock

Vacuum Circuit Breaker Unit (V Unit)



V

Dimensions:

Width: 440mm

Depth: 920mm

Height: 1950mm

Weight: 350kg

Technical Data

Vacuum Circuit Breaker	SecoVac-R 36
Rated voltage	36kV
Rated power frequency withstand voltage (1min)	70kV
Rated lightning impulse withstand voltage	170kV
Rated current	630A
Rated short circuit breaking current	20kA
Rated short circuit making current(peak)	52kA
Rated short time withstand current and endurance time	20kA/3s
Rated cable charging current	50A
Class	E2/C2
Mechanical endurance	10000 times
Operating Sequence	O-0.3s-CO-180s-CO; O-0.3s-CO-15s-CO
Three-position switch	**IST 36**
Rated voltage	36kV
Rated power frequency withstand voltage (1min)	70kV
Rated lightning impulse withstand voltage	170kV
Rated peak withstand current	50kA
Rated short time withstand current and endurance time	20kA/3s
Mechanical endurance	2000 times

Function

Used for circuit protection, motor protection and transformer protection.

Standard configuration

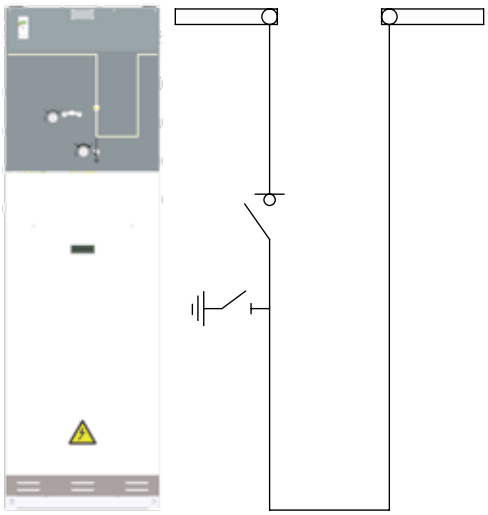
- SecoVac-R 36 vacuum circuit breaker
- IST 36 three-position switch
- Motorized operating mechanism for the vacuum circuit breaker
- Interlocking between the VCB and the 3p switch
- Interlocking between the earthing switch and the cable compartment door
- Switch position indication for vacuum circuit breaker, disconnector and earthing switch
- Potential indicator
- SF_6 gas pressure meter
- Main busbar/feeder busbar/earthing bar
- Cable bushings horizontal in front
- Operating handle

Optional Features

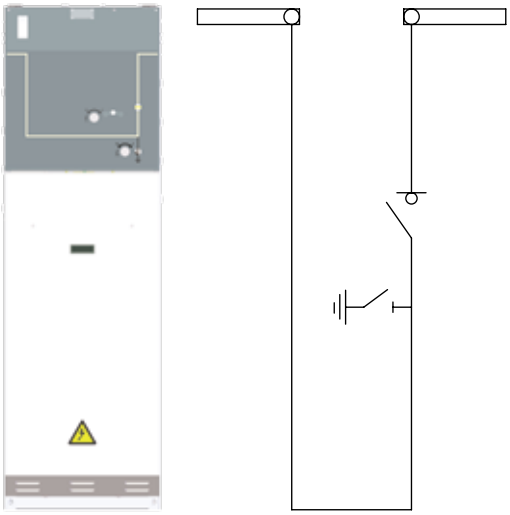
- Cancel earthing switch of the 3p switch
- Self-powered relay WIC1 with CT
- Trip coil (for relay tripping)
- Undervoltage release
- LV compartment
- Cable terminals
- Surge Arrester
- Short circuit and earth fault indicator
- Auxiliary contacts for vacuum circuit breaker position 5NO+6NC
- Auxiliary contacts for disconnector position 5NO+3NC
- Auxiliary contacts for earthing position 5NO+3NC
- Main busbar left/right out-cone bushing
- Castell or Fortress key interlock

Basic Functional Module Units

Bus Tie Unit (I Unit)



IL Type Bus Tie Unit



IR Type Bus Tie Unit

IL/IR

Dimensions:

Width: 600mm

Depth: 920mm

Height: 1950mm

Weight: 400kg

Technical Data

Load break switch		SecoLBS-K 36
Rated voltage		36kV
Rated frequency		50Hz
Rated power frequency withstand voltage (1min)	To earth/phase to phase	70kV
	Across isolating distance	80kV
Rated lightning impulse withstand voltage	To earth/phase to phase	170kV
	Across isolating distance	195kV
Rated current		630A
Rated active load breaking current		630A
Rated closed loop breaking current		630A
Rated cable charging breaking current		50A
Rated earth fault breaking current		63A
Rated cable- and line-charging breaking current under earth fault conditions		86A
Rated short circuit making current(peak)		52kA
Rated short time withstand current and endurance time		20kA/3s
Electrical Endurance		E2
Mechanical endurance		5000 times
Earthing Switch		**SecoES 36**
Rated voltage		36kV
Rated power frequency withstand voltage (1min)		70kV
Rated lightning impulse withstand voltage		170kV
Rated short circuit making current(peak)		52kA
Rated short time withstand current and endurance time		20kA/3s
Mechanical endurance		2000 times

Function

Connect or disconnect two main busbar sections, realizing busbar coupling or sectionalizing. Easy maintenance by earthing one section of the busbar.

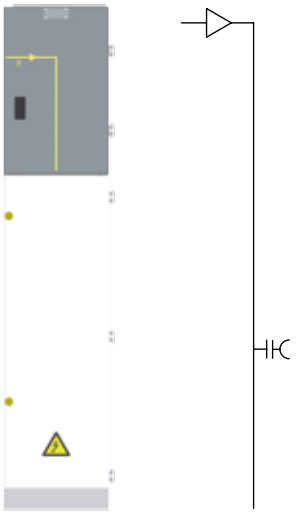
Standard configuration

- Two-position load break puffer switch and separate earthing switch
- Manual operating mechanisms with two separate operating shafts for load break function and earthing function
- Switch position indication for load break switch and earthing switch
- Potential indicator
- SF_6 gas pressure meter
- Main busbar/feeder busbar/earthing bar
- Operating handle
- Both sides extendable
- Busbar connector

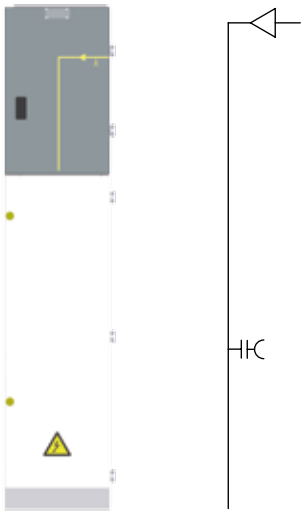
Optional Features

- Cancel earthing switch
- Motorized operating mechanism of load break switch
- LV compartment
- Surge Arrester
- Auxiliary contacts for load break switch position 3NO+3NC
- Auxiliary contacts for earthing position 2NO+2NC
- Castell or Fortress key interlock

Cable Lifting Unit (C Unit)



CL Cable Lifting Unit



CR Cable Lifting Unit

CL/CR

Dimensions:

Width: 440mm

Depth: 920mm

Height: 1950mm

Weight: 150kg

Technical Data

Cable Lifting Unit	
Rated voltage	36kV
Rated frequency	50Hz
Rated power frequency withstand voltage (1min)	70kV
Rated lightning impulse withstand voltage	170kV
Rated current	630A
Rated short time withstand current and endurance time	20kA/3s

Function

Used for connecting with incoming/outgoing cables

Standard configuration

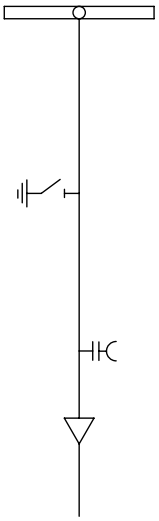
- Potential indicator
- One sides extendable
- The cable compartment door interlock

Optional Features

- Ring CT
- Cable terminals
- Surge Arrester

Basic Functional Module Units

Cable Lifting Unit with Earthing Switch (Re Unit)



Re

Dimensions:

Width: 440mm

Depth: 920mm

Height: 1950mm

Weight: 250kg

Technical Data

Cable Lifting Unit with Earthing Switch	
Rated voltage	36kV
Rated frequency	50Hz
Rated power frequency withstand voltage (1min)	70kV
Rated lightning impulse withstand voltage	170kV
Rated short time withstand current and endurance time	20kA/3s
Rated short circuit making current(peak)	52kA
Mechanical endurance	2000 times

Function

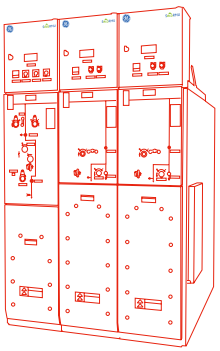
Used for connecting with incoming/outgoing cables and earthing main busbar

Standard configuration

- SecoES 36 type of earthing switch
- Manual operating mechanisms for the earthing switch
- Potential indicator
- SF_6 gas pressure meter
- Interlocking between the earthing switch and the cable compartment door
- Main busbar/feeder busbar/earthing bar
- Cable bushings horizontal in front
- Operating handle

Optional Features

- Cancel earthing switch
- Ring CT
- LV compartment
- Cable terminals
- Surge Arrester
- Short circuit and earth fault indicator
- Auxiliary contacts for earthing position 2NO+2NC



SecoRMU Configuration

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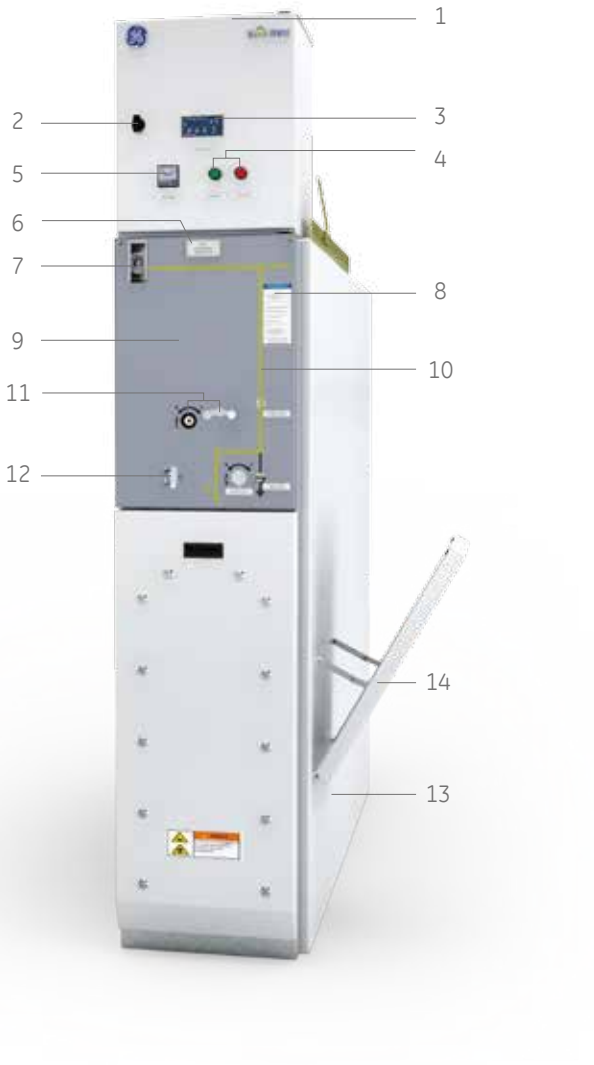
SecoRMU Configuration

SecoRMU Front Panel



1 Low voltage compartment

The LV compartment on top of the switchgear can be equipped with secondary components, a condensation monitor, a remote control unit, additional communication device, meters etc.

Dimensions:

Width: N × 440mm Depth: 360mm Height: 200mm or 500mm

2 Mechanical lock

Low voltage compartments are integrated with hinged door. Access to the hinged door is controlled by a keyed lock.

3 Capacitive high voltage indicator

The capacitive high voltage indicator works in conjunction with the integrated sensor to detect the live condition of the incoming/outgoing feeder. If also verifies the safe isolation from the supply.

The capacitive high voltage indicator with interlock function can lock the switchgear to prevent any dangerous operation or access when the equipment is live.

Test sockets are available on the front panel for phase checking.

4 Open/Close button (if motorized operated)

Open button in red also shows the switch 'ON' condition.

Close button in green also shows the switch 'OFF' condition.

Each button is equipped with a plastic cover in front of it, to prevent the accidental pressing.

5 Heat Monitor

When the ambient humidity reaches ≥ 60%RH ± 5%, the heater switches on to control the humidity and temperature inside the switchgear.

The sensor is mounted in the side wall of the cable compartment.

6 Panel labels

Shows panel description according to customer request.

7 Gas pressure viewing window

The viewing window allows viewing of the pressure indicator of the gas tank.

8 Operation labels

Instruction for load break switch manual operation, including maintenance operation steps and energizing operation steps.

9 Front cover

Covers are manufactured of cold-roll steel sheet with painting.
Color for mechanism compartment cover is RAL 7040; while the upper and lower front covers are of the color RAL 9003.

10 Simulation single line diagram

Highly visible representative diagram shows the main configuration of the switchgear. Position indicators show the status of the load break switch and earthing switch.
Screen painting process makes the single line diagram extremely durable.

11 Operating aperture/interlock selector

Insert operating handle into the aperture to operate the load break switch or the earthing switch. There is mechanical interlocking between the two switches. Move the interlock selector the left side, the earthing switch aperture will be exposed. Move the interlock selector to the right side, the load break switch aperture will be exposed.

12 Interlock lever

There is mechanical interlocking between the earthing switch and cable compartment door. When earhing switch is operated to the closed position, lift the interlock lever and remove the cable compartment door.

13 Cubicle frame

Cubicle frame is not only the basic part for components assembling, but also used to support and fix the gas tank.The frame is made of no less than 2mm thick Aluminum-zinc coated plate and assembled by high strength bolts and rivet nuts.

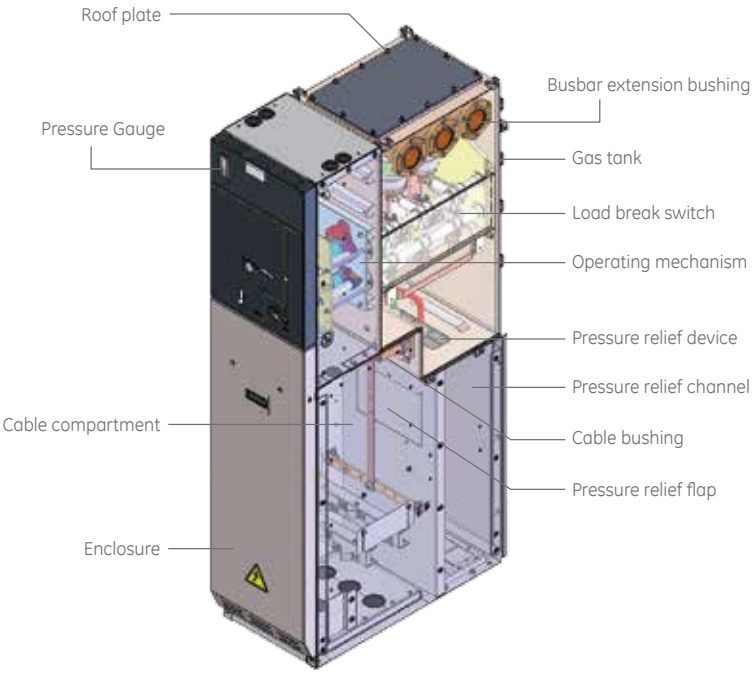
14 Toolbox

There is delicate toolbox design on the side of the panel, with user manual, operating handles, charging handle etc. inside. Operators will find the relative tools and documents on site more conveniently.

SecoRMU Configuration

Load Break Switch Unit

- The load break switch is assembled in the sealed gas tank filled with SF_6. It is of straight-moving puffer design with strong interrupting capacity
- The speed and strength of LBS and ES operation is determined by the spring-driven mechanism, which will not be influenced by different operators
- The switch positions are close and open. In the open position, the switch satisfies the disconnector requirements
- There is mechanical interlocking between LBS operation shaft and ES operation shaft



Switch-Fuse Combination Unit

- The switch-fuse combination unit is composed of high breaking current-limit fuse, two position load break switch and separate earthing switch
- The fuse which is fitted in the epoxy casted insulating canister plays an important role in protecting up to 2000kVA transformer
- When short circuit happens, the striker pin can activate the mechanism of the LBS. The LBS will trip immediately and the current is broken by the fuse
- The downstream earthing switch, which has connection with the main earthing switch, makes the feeder side of the T panel earthed reliably. When carry out earthing operation, the downstream earthing switch will be operated aligned with the main earthing switch to ensure both sides of the fuse are earthed reliably. So that operator can carry out fuse replacement and installation in safety

Vacuum Circuit Breaker Unit

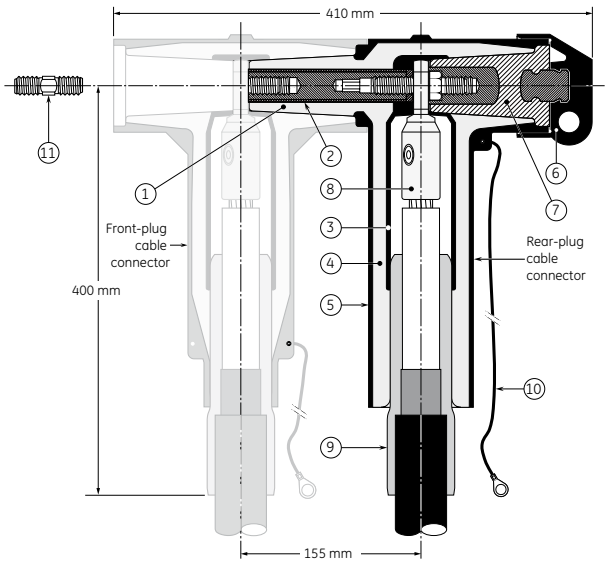
- The vacuum circuit breaker unit has 3 vacuum bottles for extinguishing short circuit current
- The vacuum circuit breaker is equipped by a modularized spring-charging mechanism, which can be operated manually or electrically. Thanks to the optimized design, fewer components are used and high reliability is realized
- The moving contact of the three-position switch achieves 3 stable positions, makes natural interlocking
- The mechanical interlock is provided to make it impossible to operate the 3p switch when the circuit breaker is in the closed position

Cable compartment

- The cable compartment consist of cable terminals, earthing bars, cable clamps, HV cables etc. It is available for mounting ring CT and surge arrester if required
- Cables are bottom entry. Cable compartment allowing max. double cable connection by using Nexans cable adapters. For 2 cables per phase connections, cable compartment cover maintain the same depth as the standard unit
- If an arc fault occurs in the cable compartment, the pressure relief device at the rear of the cable compartment will open, to vent the gas through the arc duct to the bottom of the panel

Cable Terminal

- Shielded type
- Front plug cable connector, rear plug cable connector, rear plug surge arrester
- Applicable standards: EN50181 and DIN47636



1. Interface designed to fit front-plug cable connector
2. Bus for rear-plug cable connector
3. Conductive EPDM insert
4. Insulating EPDM layer moulded between the insert and the jacket
5. Conductive EPDM jacket
6. Conductive EPDM cap
7. Basic insulating plug
8. Conductor connector (hexagonal crimping, deep indent crimping or bolted)
9. Cable reducer
10. Earthing lead
11. Threaded M16 stud for the equipment bushing

SecoRMU Configuration

Gas System

- The SF_6 inside the SecoRMU gas tank is non-toxic, non-combustible, and chemically inactive. In the VCB panel, the making and breaking of the arc is achieved by the vacuum interrupter, whilst the SF_6 gas provides insulation
- The use of busbar connectors allows panel installation to be performed without impacting the gas system. Eliminating the need to work with the gas on site
- During an arcing of LBS making and breaking, some of the insulating gas decomposes under the high temperatures. The gas will recompose and recover after post-arc at lower temperatures whilst the remainder will be absorbed by the sorbent in the tanks

Temperature compensated pressure gauge (standard)

A simple visual check of the red/green indicator shows if the panel is ready for service. The red and green area differs at the junction of 1.25bar (20˚C, abs.). The pointer in the green area shows the normal pressure, the pointer in the red area shows need to re-gas.

Gas density monitor (Optional)

Each gas tank can be equipped with a gas density monitor, allowing the operator to monitor the gas pressure both locally or remotely. In the event of a pressure decrease to the set point alarm pressure, the gas meter will give an alarm signal and/ or trip and/or lock the circuit breaker.

Mechanical Interlocks

- All operating mechanisms are situated outside the SF_6 gas tank and behind the front cover. It's easy to access the operating mechanism if retrofit or service should be required
- Push the interlock selector to the left or right, to expose the corresponding operation apertures to operate the load break switch/disconnector or earthing switch
- The cable compartment can only be accessed when the earthing switch is in the closed position.It will also be impossible to operate the load break switch or disconnector or circuit breaker or open earthing switch before cable compartment door is put back in place
- In the switch-fuse combination panel, the fuse compartment can only be accessed when the two sides earthing switches are in the closed position
- It's impossible to operate the load break switch/disconnector when the earthing switch is in earthed position. It's also impossible to operate the earthing switch when the load break switch/disconnector is in closed position
- In the VCB panel, by means of the mechanical knob it is possible to close and open the circuit breaker. The opening spring is always charged when the circuit breaker is in closed position and will be ready to open immediately if the protection control unit gives a trip signal
- In the VCB panel, the mechanical interlock is provided to make it impossible to operate the 3p switch when the circuit breaker is in the close position

Key Interlocking

Medium-voltage key interlocking system between panels or between panels and upstream or downstream equipment are widely used in IEC market. The purpose is to prohibit incorrect operation and bring users the following benefits.

key interlocking systems guarantee:

- Safety of personnel
- Safety of equipment
- Sequence of operation

SecoRMU can achieve the following applications by use of Castell or Fortress.

Key Interlocking

SecoRMU Configuration

Pressure Relief System

Arc Relief Device

Each gas tank of SecoRMU is equipped with a pressure relief device. If an internal arc fault occurs, and the actual pressure exceeds its designed relief pressure, the pressure relief device will open, allowing the pressurized gas flow through to the pressure relief passage to release the pressure, thus ensures the safety of the equipment and personnel.

Classification according to
IEC62271-200: IAC AFLR 20kA/1s

WARNING

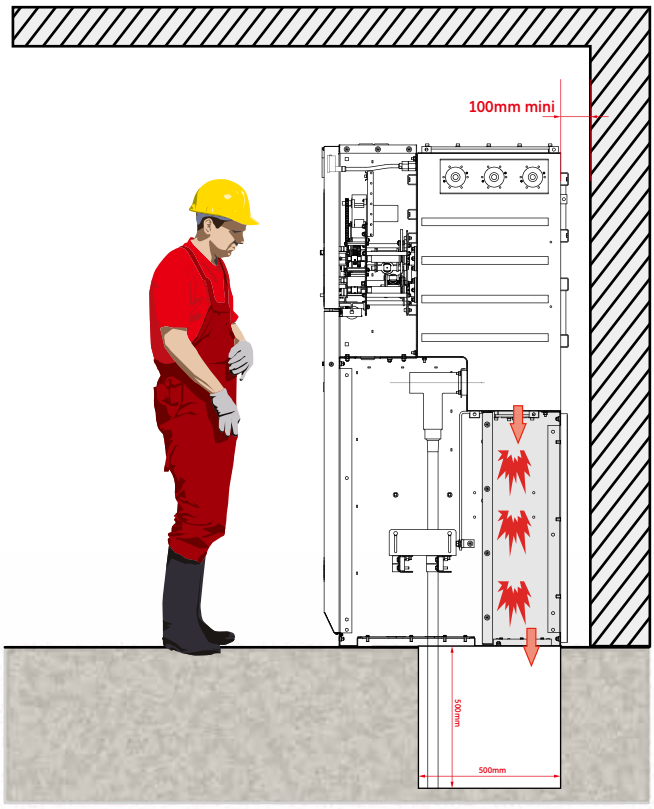
evacuation of the SF_6 gas after internal arc happens

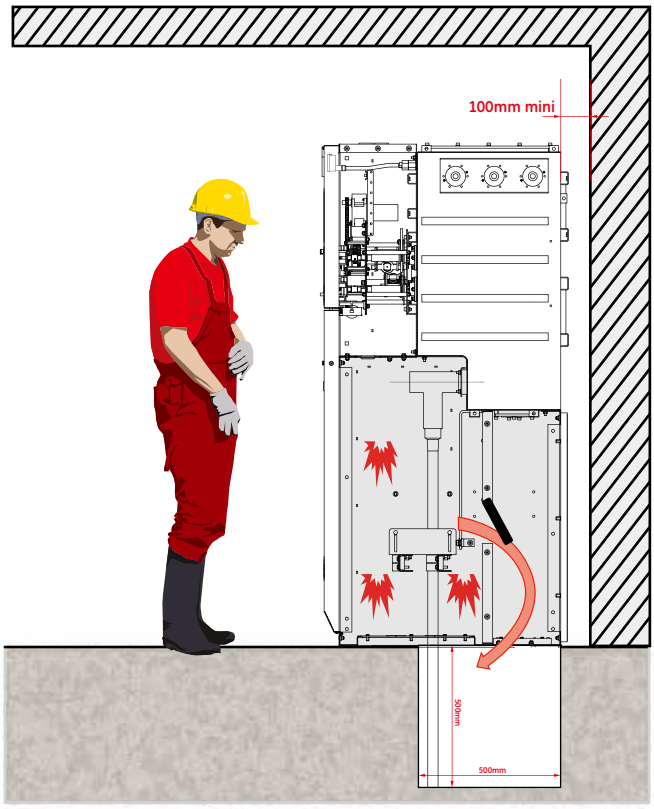
Internal arc happens in the gas tank (1)

Internal arc happens in the cable compartment (2)

NOTICE

Minimum dimension of the cable trench:
Width = 440mm
Depth = 500 mm
Height = 500 mm





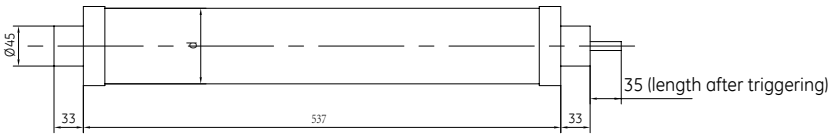
Transformer Protection by Switch-Fuse Combination

The striker pin of the fused holder can activate the spring charging mechanism of the load break switch when a fault occurs. The load break switch will trip immediately and the current will be broken by the fuse.

Fuse Replacement

According to IEC recommendations, when a fuse has blown, all three fuses should be replaced.

HV fuse meet IEC60282-1 standard. Dimension of SIBA Fuse (Recommended)



Rated Current	Length (E)	Diameter (D)
6.3A ≤ In ≤ 25A	537mm	53mm
31.5A ≤ In ≤ 40A		67mm
50A ≤ In ≤ 100A		85mm

Recommended Fuse Ratings for Transformer (Normal operating with no overload, -25℃ < Φ < 40℃)

Rated voltage (kV)	Transformer Output (KVA)	Uk %	Fuse link rated current (A)	Rated breaking current (kA)	SIBA article number
36	100	4	6.3	40	30 008 13.6.3
36	125	4	10	40	30 008 13.10
36	160	4	10	40	30 008 13.10
36	200	4	10	40	30 008 13.10
36	250	4	16	40	30 008 13.16
36	315	4	16	40	30 008 13.16
36	400	4	20	40	30 008 13.20
36	500	4	25	40	30 008 13.25
36	630	4	31.5	40	30 016 13.31.5
36	800	5	31.5	40	30 016 13.31.5
36	1000	6	40	40	30 016 13.40
36	1250	6	40	40	30 016 13.40
36	1600	6	63	40	30 024 13.63
36	2000	6	63	40	30 024 13.63

Recommended Fuse Ratings for Transformer (Normal operating with 20% overload, -25℃ < Φ < 40℃)

Rated voltage (kV)	Transformer Output (KVA)	Uk %	Fuse link rated current (A)	Rated breaking current (kA)	SIBA article number
36	100	4	6.3	40	30 008 13.6.3
36	125	4	10	40	30 008 13.10
36	160	4	10	40	30 008 13.10
36	200	4	16	40	30 008 13.16
36	250	4	16	40	30 008 13.16
36	315	4	20	40	30 008 13.20
36	400	4	25	40	30 008 13.25
36	500	4	25	40	30 008 13.25
36	630	4	31.5	40	30 016 13.31.5
36	800	5	31.5	40	30 016 13.31.5
36	1000	6	40	40	30 016 13.40
36	1250	6	50	40	30 024 13.50
36	1600	6	63	40	30 024 13.63

Note: Table above is based on SIBA type fuses. If other brand fuse is required, please contact GE in advance.

Measurement, Protection and Control

For more information visit our website: http://www.gedigitalenergy.com/multilin/catalog/3Series.htm

Multilin 3 Series

Intuitive industrial and utility protective relay systems for feeders, motors and transformers

Key benefits

- Easy-to-use and cost effective protection and control for feeders, motors and transformers
- Effortless draw-out construction eliminates requirements for test switches and reduces downtime
- Environmental monitoring system to alarm on destructive operating conditions to enable preventative maintenance
- Easy-to-use interface and set up in one simple step
- Accelerated Life Cycle Tested to ensure reliability of relay operation under abnormal conditions
- Advanced power system diagnostics to increase reliability through fault and disturbance recording capabilities
- Arc Flash mitigation via zone intertripping, flex curves and multiple setting groups
- Application flexibility with the use of programmable logic elements
- Large backlit display with 40 characters for easy viewing of relay information and settings
- Flexible communications with multiple ports & protocols to allow seamless integration into new and existing infrastructure
- Easy access to information via multiple communication network options including USB, Serial, Fiber & Copper Ethernet
- Reduced wiring with support for remote I/O
- Reduced setup and configuration time with the Simplified Motor Setup screen
- Powerful Security Audit Trail tool to increase security and minimize system risks by tracking setting changes

Applications

- Advanced protection, monitoring & control relays for feeders (Multilin 350), motors (Multilin 339) and transformers (Multilin 345)
- Industrial feeders with enhanced breaker monitoring and diagnostics
- Distribution utility downstream breaker protection
- Medium voltage utility feeders with advanced control features including, cold load pickup, auto reclose and multiple setting groups

Features

Protection & control
(for Multilin 350 Feeder Protection System)

- Phase, neutral and ground TOC and IOC
- Undervoltage, overvoltage, frequency
- Neutral/ground directional
- Negative sequence overcurrent
- ANSI, IAC, IEC, flex curves
- Cable Thermal Model protection
- Breaker failure
- Cold load pick-up
- Four-shot auto reclose
- 8 digital inputs, 7 contact outputs
- Two setting groups

Metering & monitoring

- Event Recorder: 256 events with 1ms time stamping
- Oscillography with 32 samples per cycle and digital states
- IRIG-B clock synchronization
- Relay & Asset Health Diagnostics
- Security audit trail

User interface and programming

- 4x20 character LCD display
- Control panel with 12 LED indicators
- Front USB and rear serial, Ethernet and Fiber ports
- Multiple protocols - IEC 61850 & 61850 GOOSE, ModBus ™ RTU, ModBus ™ TCP/IP, DNP 3.0, IEC 60870-5-104, IEC 60870-5-103

EnerVista ™ software

- An industry-leading suite of software tools that simplifies every aspect of working with Multilin devices
- Document and software archiving toolset to ensure reference material and device utilities are up-to-date

Overview

The Multilin 3 Series of protection relays are highly functional, economical protection relays for feeders, motors and transformers. By providing an economical system for protection, control, monitoring and metering, and with both local and remote user interfaces in one assembly, the Multilin 3 Series relays effectively eliminate the need for expensive discrete components.

The Multilin 3 Series provides detailed diagnostic information allowing users to troubleshoot and minimize downtime. Detailed diagnostics are provided via the 256 1ms time stamped event recorder and the 192 cycle Oscillography report sampled at 32 samples per cycle.

The robust Multilin 3 Series streamlines user work flow processes and simplifies engineering tasks such as configuration, wiring, testing, commissioning, and maintenance. This cost-effective relay also offers enhanced features such as diagnostics, preventative maintenance, device health reports and advanced security features.

Easy-to-use

Drawout construction

The Multilin 3 Series offers a complete drawout feature, eliminating the need for rewiring after testing has been concluded. The withdrawable feature also eradicates the need to disconnect communication cables, e.g. fiber, copper, RJ45, etc and helps retain the communication status even after a relay has been withdrawn from its case.

Advanced communications

Easy integration into new or existing infrastructure

With several Ethernet and serial port options and a variety of communication protocols, the Multilin 3 Series provides advanced and flexible communication selections, enabling seamless integration into new or existing applications.

The Multilin 3 Series supports various industry standard protocols such as, IEC 61850 & IEC 61850 GOOSE, Modbus RTU, Modbus TCP/IP, DNP3.0, IEC 60870-5-104 and IEC 60870-5-103.

Enhanced diagnostics

Preventative maintenance

The Multilin 3 Series allows users to track relay exposure to extreme environmental conditions by monitoring and alarming at high temperatures. This data allows users to proactively schedule regular maintenance work and upgrading activities.

All relays utilize EnerVistaTM setup software for communication, monitoring and metering. Actual values, setpoints, status, trending and waveform capture information can all be viewed via the software and can be used for troubleshooting.

EnerVista™ Launchpad

EnerVista™ Launchpad is a complete set of powerful device setup and configuration tools that is included in the SR relays at no extra charge.

- Set up the Multilin 3 Series Relays - and any other Multilin device - in minutes. Retrieve and view oscillography and event data at the click of a button
- Build an instant archive on any of the latest Multilin manuals, service advisories, application notes, specifications or firmware for your SR Relay
- Automatic document and software version updates via the internet and detailed e-mail notification of new releases

Security

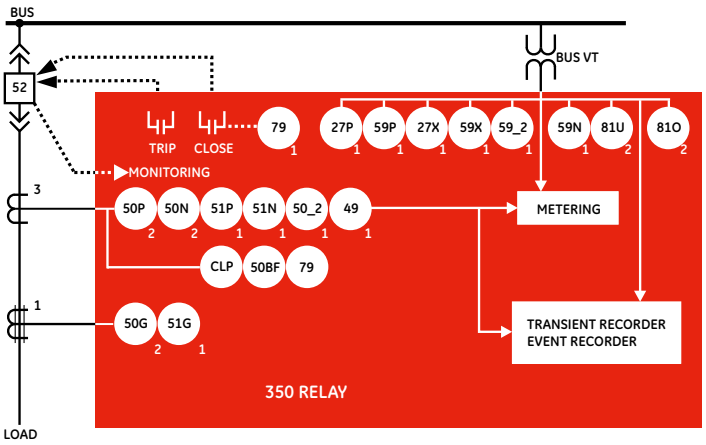
Security audit trail

The Multilin 3 Series monitors security and reliability of asset protection. The Multilin 3 Series protection devices offer complete traceability of any relay setting and command changes, allowing the user to quickly identify changes made to the relay.

User Interface

- SETPOINT GROUP 1, 2:
  These indicators are continuously on if the corresponding group provides settings for protection elements.
  TRIP:
  The indicator turns on when the relay detects a trip condition.
  Operates the trip relay to open the breaker.
  ALARM:
  While the relay detects an alarm condition, the indicator flashes.
  PICKUP:
  Indicator lights steady when any protection feature pickup threshold exceeded.
- DISPLAY:
  4 line text for easy viewing of key data.
- LEDs:
  10 LED indicators for quick diagnostics.
- KEYPAD:
  Ten button keypad for access to device interrogation and change of settings.
- FRONT PORT:
  An electrically isolated front USB communication port.

Protection Features



ANSI Device Numbers & Functions

Device Number	Function
27P	Phase Undervoltage
27X	Auxiliary Undervoltage
49	Thermal Model
50P	Phase Instantaneous Overcurrent
50N	Neutral Instantaneous Overcurrent
50G	Ground/Sensitive Ground Instantaneous Overcurrent
50BF	Breaker Failure
50_2	Negative Sequence Overcurrent
51P	Phase Timed Overcurrent
51G	Ground Timed Overcurrent
51N	Neutral Timed Overcurrent
59P	Phase Overvoltage
59X	Auxiliary Overvoltage
59N	Neutral Overvoltage
59_2	Negative Sequence Overvoltage
67G	Ground Directional Overcurrent
67N	Neutral Directional Overcurrent
79	Autoreclose
81U	Underfrequency
81O	Overfrequency
CLP	Cold Load Pickup

Latched Lockout available as a standard feature

Tools and Accessories

Busbar Connector

Ring main units are joined together by plug-in busbar connectors.
The modular nature of the panel ensures ease of installation and extension without the need for extra gas handling activities on site.
With the busbar connector, SecoRMU realizes no clearance connection, preventing people from touching the high voltage live parts.

Busbar Extension Bushing

The inner-cone busbar extension bushing is a gas tight component assembled on the gas tank for electrical connection. A white plastic protection cover will be on the bushing during transportation and storage.
Inner-cone bushing can be used for busbar connection and testing adapter connection.

Cable Bushing

Outer-cone bushing are used for cable terminal connection. A black plastic protection cover will be on the bushing during transportation and storage.
An integrated sensor inside the cable bushing, provides a voltage signal to the potential indicator. The indicator can display whether the cable is live or not.
The out-cone cable bushing comply to standard DIN 47636 and EN 50181.

End Plug

Used for sealing the side panel of a line-up. Keep the switchgear for future extension.

Tools and Accessories

Capacitive High Voltage Indicator

Panels are equipped with capacitive high voltage indicator system for testing the circuit live or not.

The high voltage indicator with interlocking function can provide reliable interlocking, avoiding misoperation and entry into the live power equipment.

Short Circuit and Earth Fault Indicator

The short circuit and earth fault indicator is designed to detect, display and remotely indicate phase selective short circuits and earth faults in medium voltage distribution networks.

In the power system, if short circuit or earth fault occurs in the downstream network, the upstream network should trip the circuit in a limit period to avoid fault impact expansion. After that, the downstream network will be power off.

With the fault indicator, operators can locate and find out the failure network more easily, so as to disconnect the failure part and to recover the power supply of the good network section in short time.

Earth Fault Sensing CT

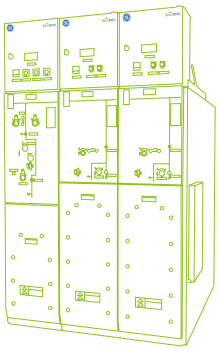
The split type zero-sequence CT is mounted on the feeder side for measuring phase currents and detecting the earth fault current. All the power cables in a panel are routed through the CT. Zero-sequence CT is usually installed in the cable trench below the switchgear.

Inductive Current Transformer

The ring CT is mounted outside the gas tank, eliminating exposure to dielectric stress.

Cast in resin and totally enclosed, provides superior protection against pollutants and moisture.

It can be equipped with one or more independent magnetic cores with equal or different characteristics for measuring, metering and protection purposes.



SecoRMU Applications

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SecoRMU Applications

Outdoor Switching Substation

The outdoor ring main unit substation adopts a metal-enclosed prefabricated structure, with excellent mechanical strength. Its protection degree can reach IP33, which protect the machine against the harmful effects of the ingress of water and solid foreign objects (like small animals).

Ventilation

There are louvers on the upper and lower sections of each side of the enclosure, with removable filters fitted inside.

Thermal Insulation

The roof is lined with double-layer high-quality heat insulation foam.

Anti-condensation

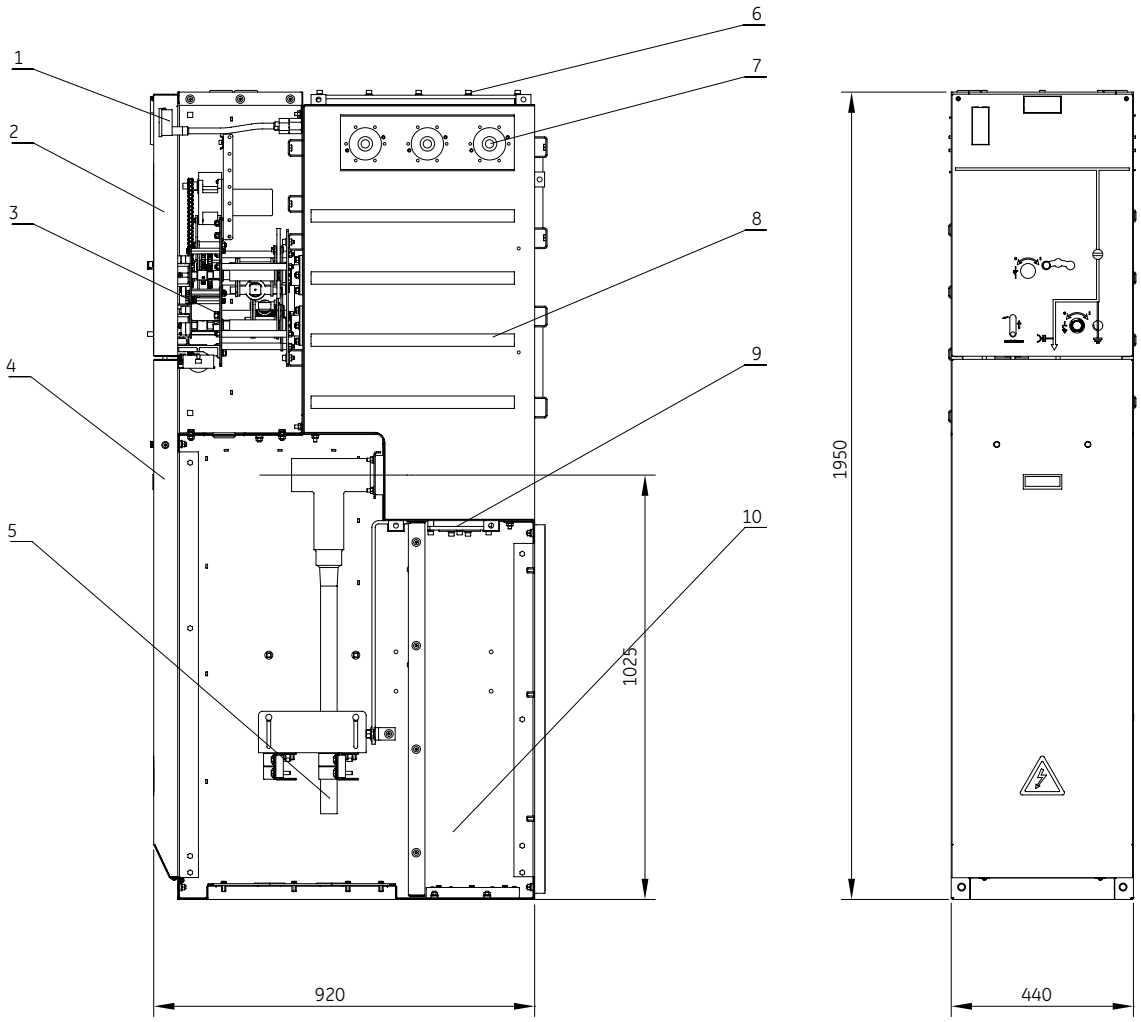
The slope of the roof is designed more than 3°. The big roof cover, combined with good ventilation, prevents the switching substation from condensating.

	W(mm)	D(mm)	Height		
			No LV compartment	With 200mm LV compartment	WIth 500mm LV compartment
2-way	1500	1400	2300	2500	2800
3-way	2000	1400	2300	2500	2800
4-way	2400	1400	2300	2500	2800
5-way	2900	1400	2300	2500	2800

Note
1) Panels should be installed and combination before moving into the outdoor enclosure.
2) Other dimension request, please contact GE.

SecoRMU Dimensions

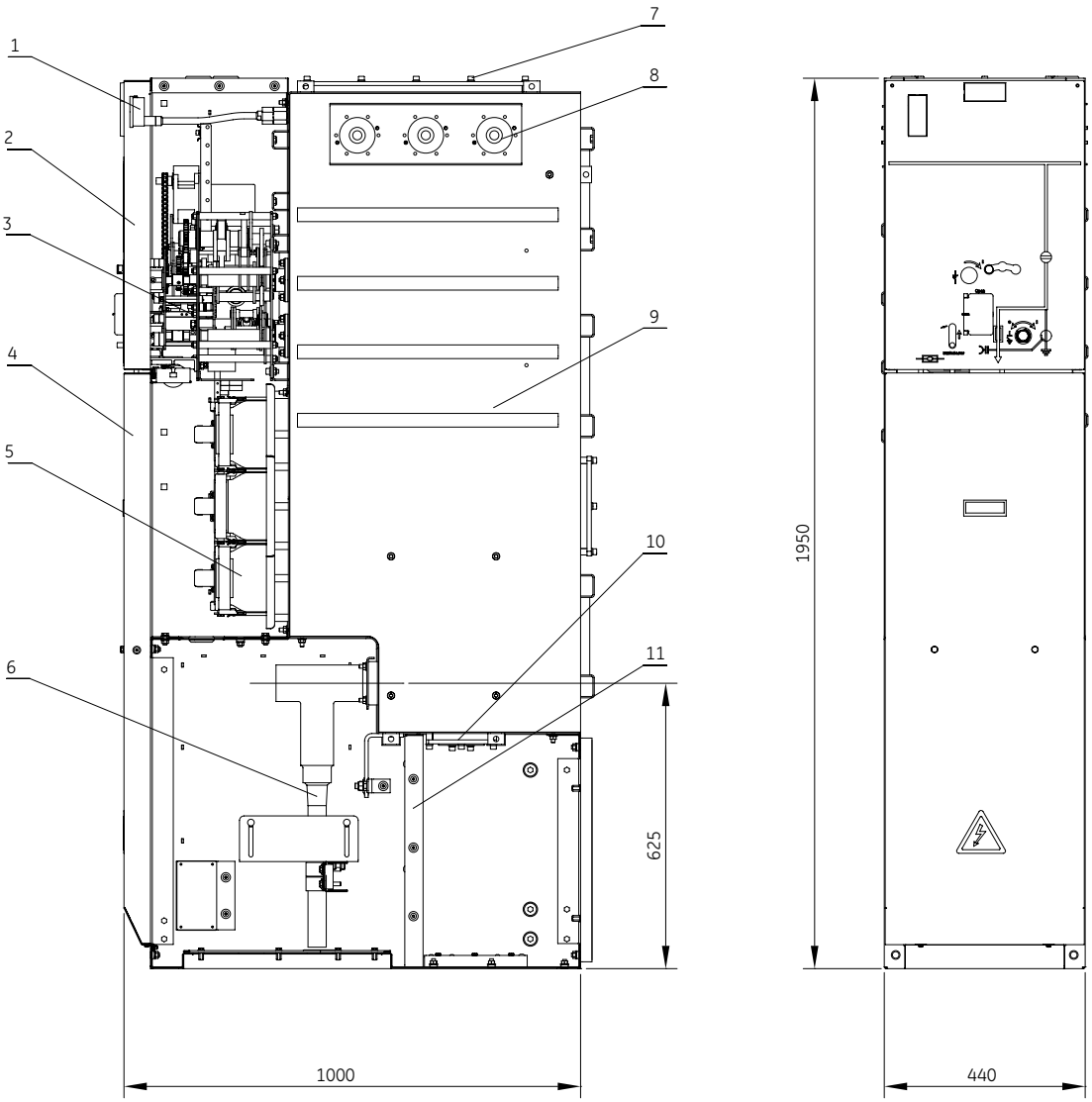
K Panel



1.Gas pressure meter
2.Mechanism compartment cover
3.LBS/ES operating mechanism
4.Cable compartment cover
5.HV cable
6.Top cover
7.Inner-cone bushing for main busbar
8.Gas tank
9.Pressure relief valve of gas tank
10.Enclosure

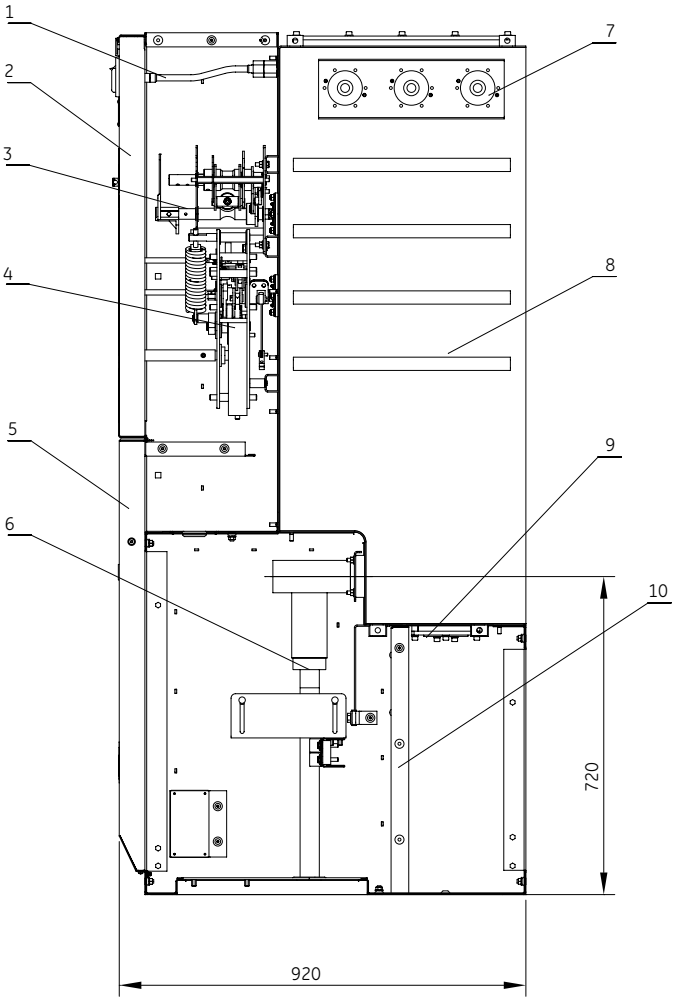
SecoRMU Dimensions

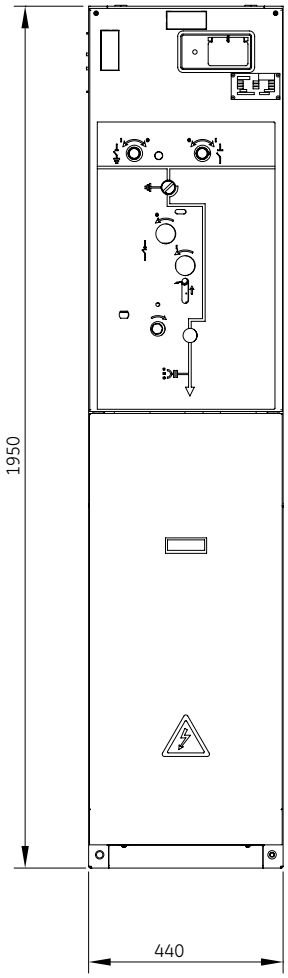
T Panel



1.Gas pressure meter
2.Mechanism compartment cover
3.LBS/ES operating mechanism
4.Cable compartment cover
5.Fuse holder
6.HV cable
7.Top cover
8.Inner-cone bushing for main busbar
9.Gas tank
10.Pressure relief valve of gas tank
11.Enclosure

V Panel

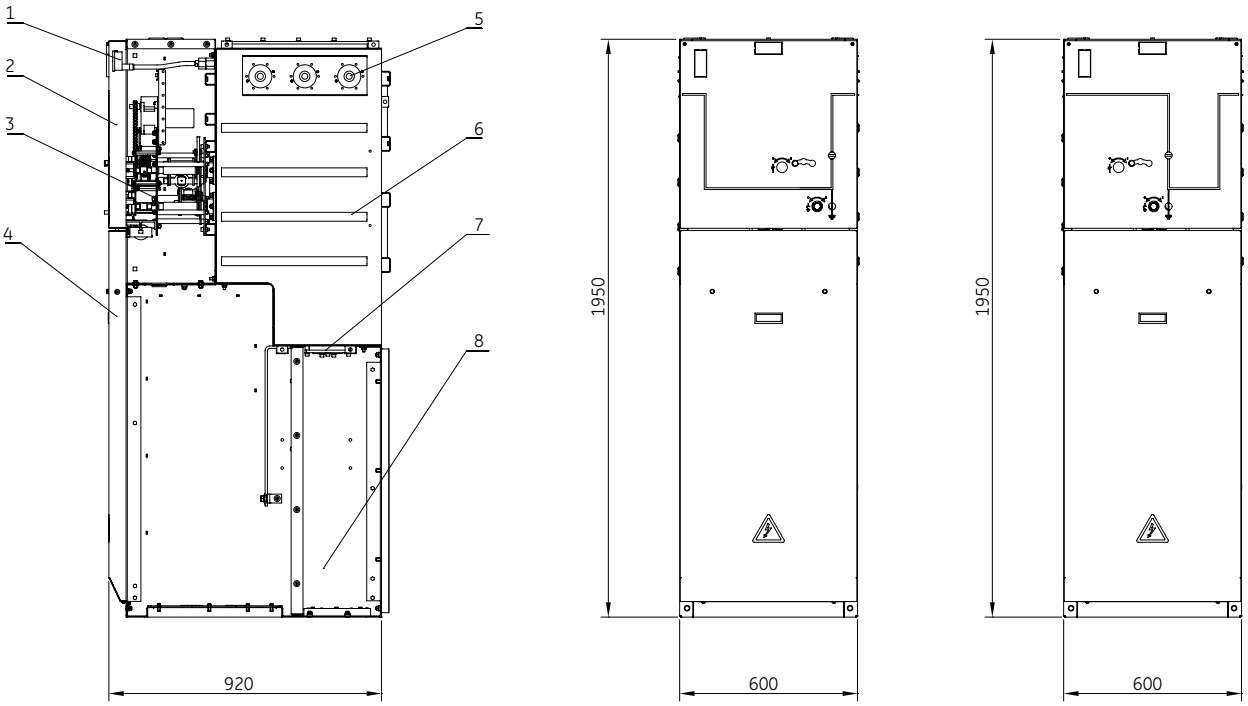




1.Gas pressure meter
2.Mechanism compartment cover
3.3-position switch operating mechanism
4.VCB operating mechanism
5.Cable compartment cover
6.HV cable
7.Inner-cone bushing for main busbar
8.Gas tank
9.Pressure relief valve of gas tank
10.Enclosure

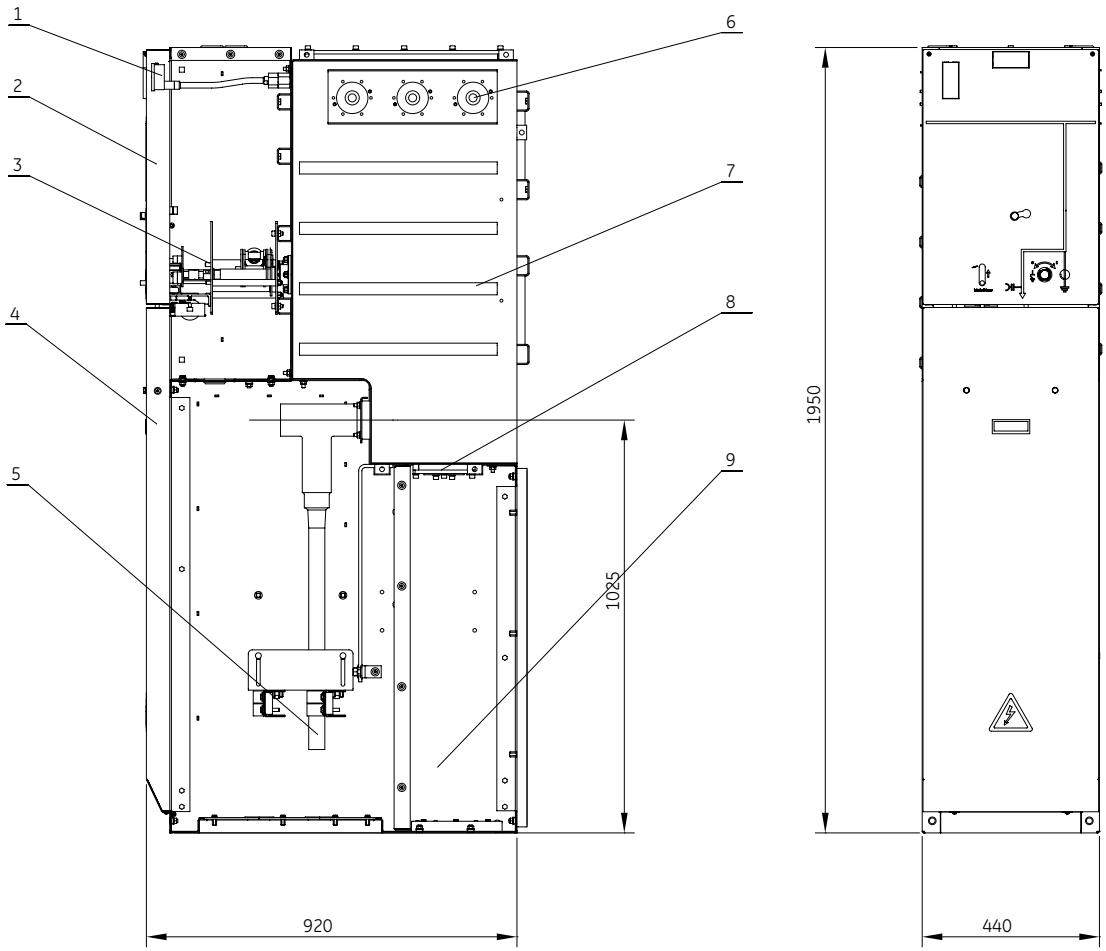
SecoRMU Dimensions

I Panel



1.Gas pressure meter
2.Mechanism compartment cover
3.LBS/ES operating mechanism
4.Cable compartment cover
5.Inner-cone bushing for main busbar
6.Gas tank
7.Pressure relief valve of gas tank
8.Enclosure

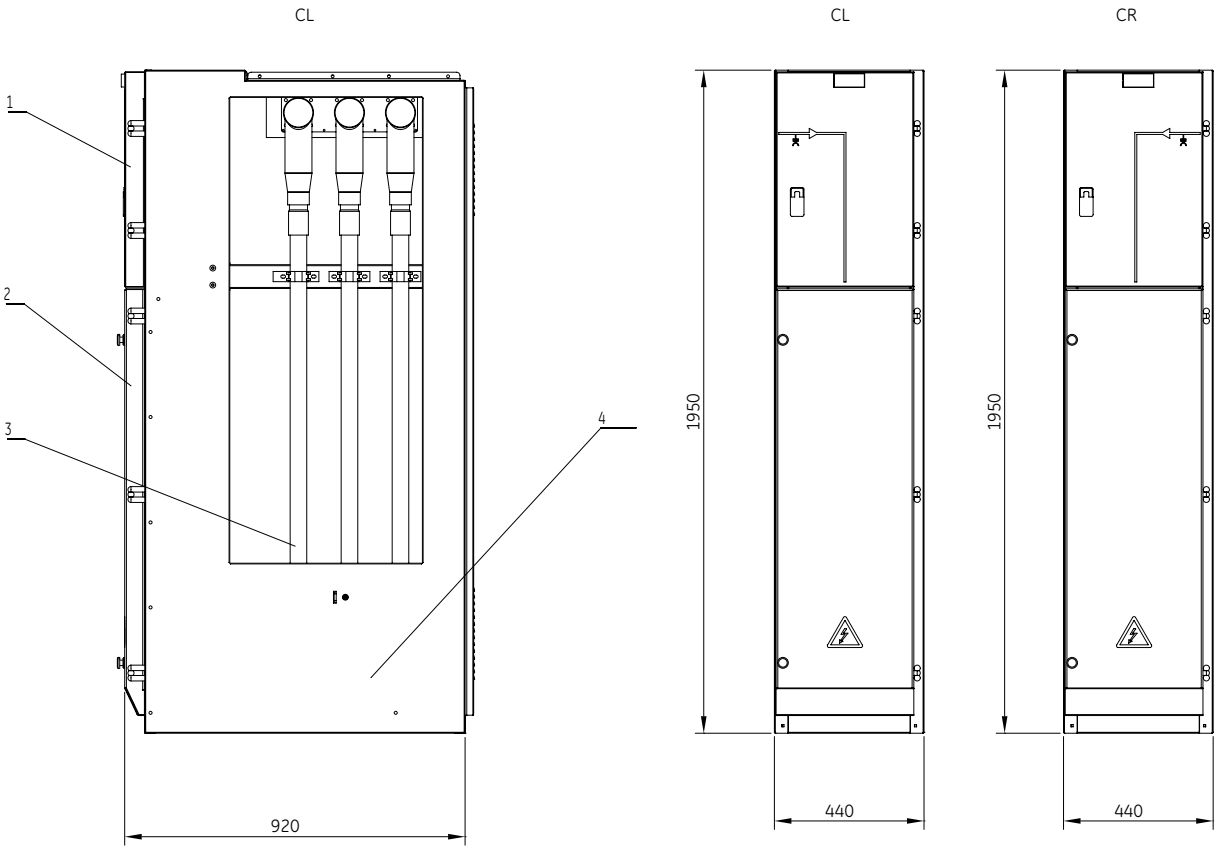
Re Panel



1.Gas pressure meter
2.Mechanism compartment cover
3.Earthing switch operating mechanism
4.Cable compartment cover
5.HV cable
6.Inner-cone bushing for main busbar
7.Gas tank
8.Pressure relief valve of gas tank
9.Enclosure

SecoRMU Dimensions

C Panel



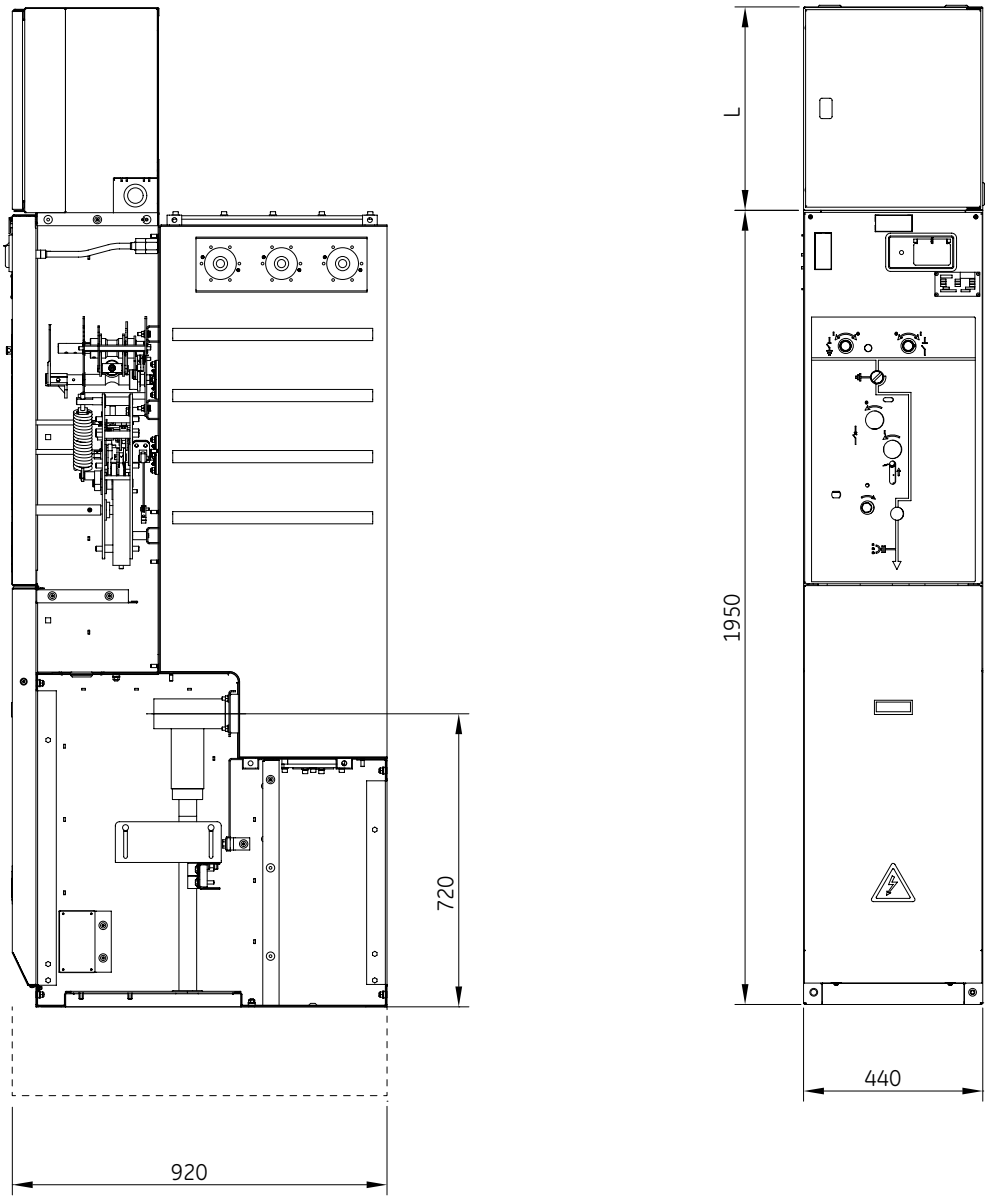
1.Front cover

2.Cable compartment cover

3.HV cable

4.Enclosure

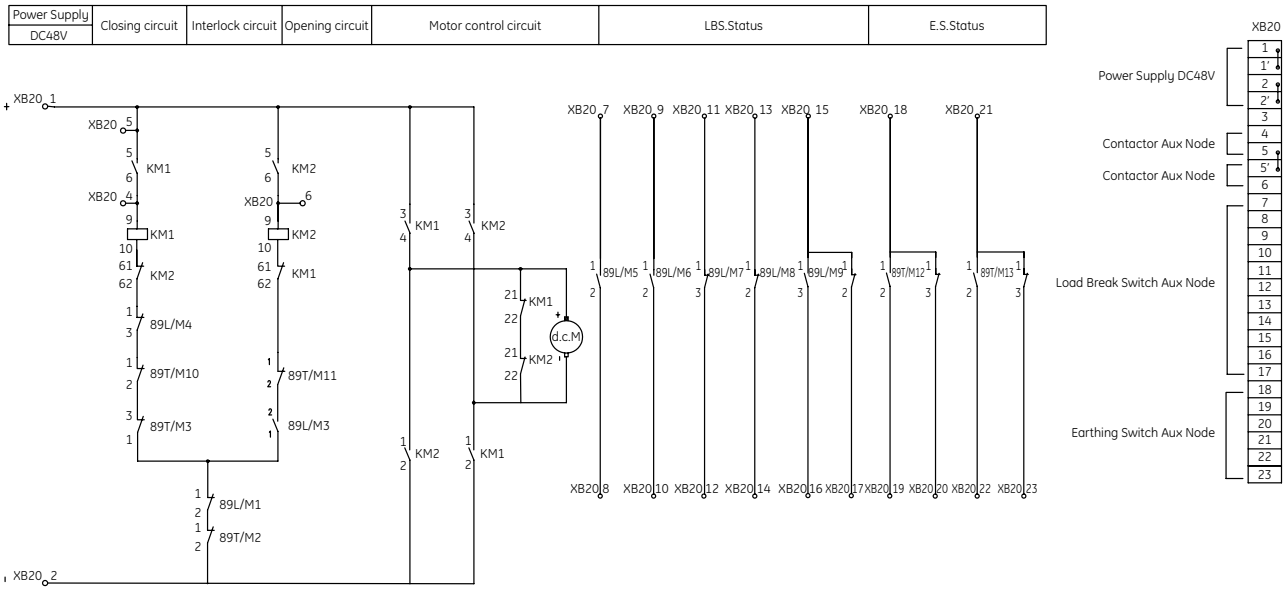
LV compartment on the top of the RMU



*Note: Can install LV compartment as per customer requirement. Height: L = 200(or 500) mm

SecoRMU Control Circuit Schematic Drawing

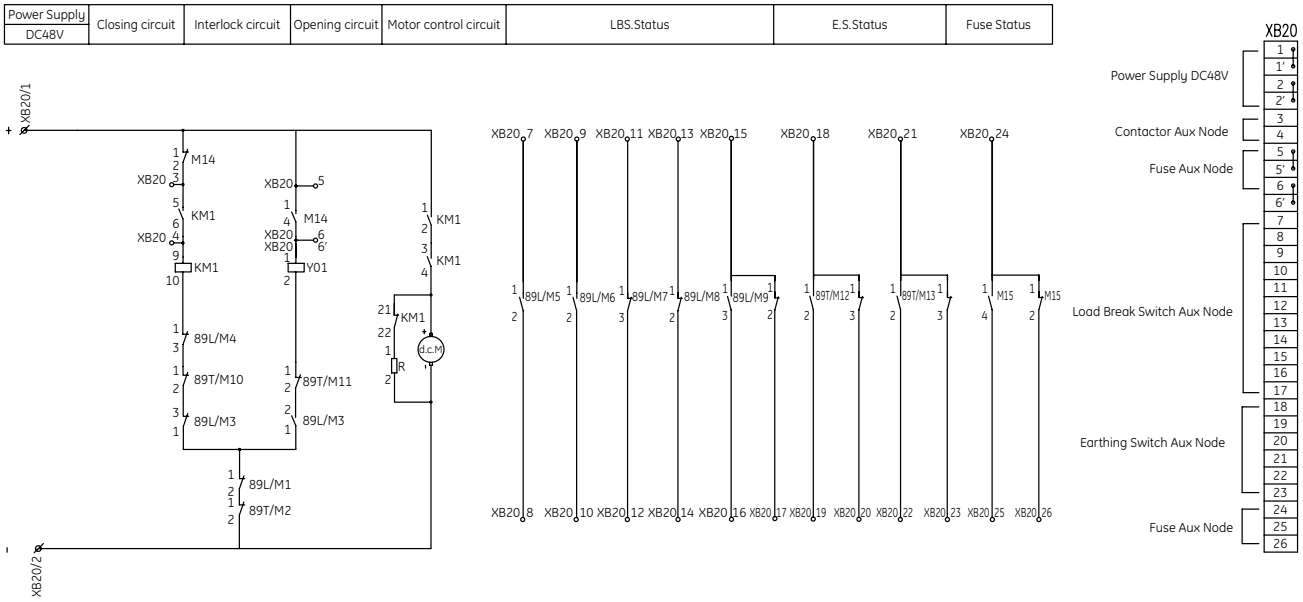
K Panel



Remark:
The initial status of this diagram shows LBS and earth circuit opened.

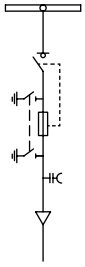
No.	Symbol	Description	Quantity	Note
1	KM1,KM2	Contactor	2	
2	d.c.M	DC Motor	1	150W
3	89L/M1	Load Break Switch Auxiliary Contact	1	Operating Handle Interlock
4	89T/M2	Earthing Switch Auxiliary Contact	1	Operating Handle Interlock
5	89L/M3-9	Load Break Switch Auxiliary Contact	7	
6	89T/M10-13	Earthing Switch Auxiliary Contact	4	
7	XB20	Terminal	26	

T Panel



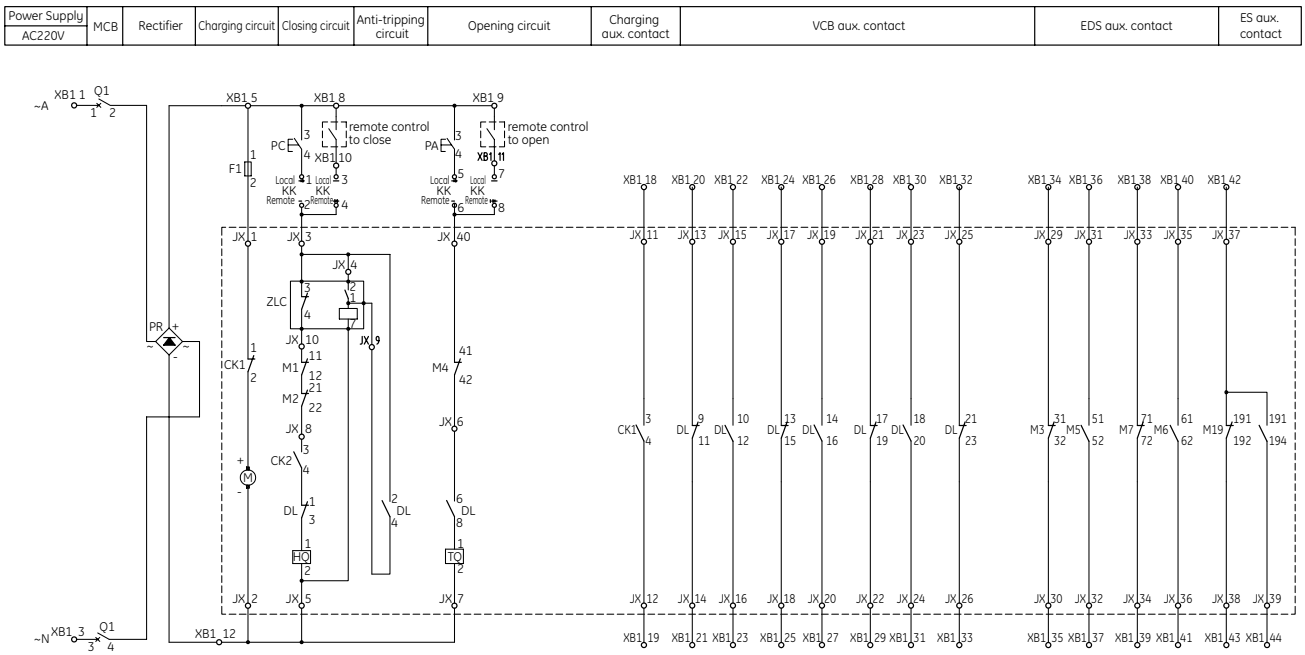
Remark:
The initial status of this diagram shows LBS and earth circuit opened.

No.	Symbol	Description	Quantity	Note
1	KM1	Contactor	1	
2	M	DC Motor	1	150W
3	89L/M3~9	Load Break Switch Auxiliary Contact	7	
4	89T/M10~13	Earthing Switch Auxiliary Contact	4	
5	89L/M1	Load Break Switch Auxiliary Contact	1	Operating Handle Interlock
6	89T/M2	Earthing Switch Auxiliary Contact	1	Operating Handle Interlock
7	M14, M15	Fuse Auxiliary Contact	2	
8	Y01	Trip coil	1	
9	R	Resistance	1	
10	XB20	Terminal	30	

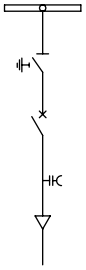


SecoRMU Control Circuit Schematic Drawing

V Panel

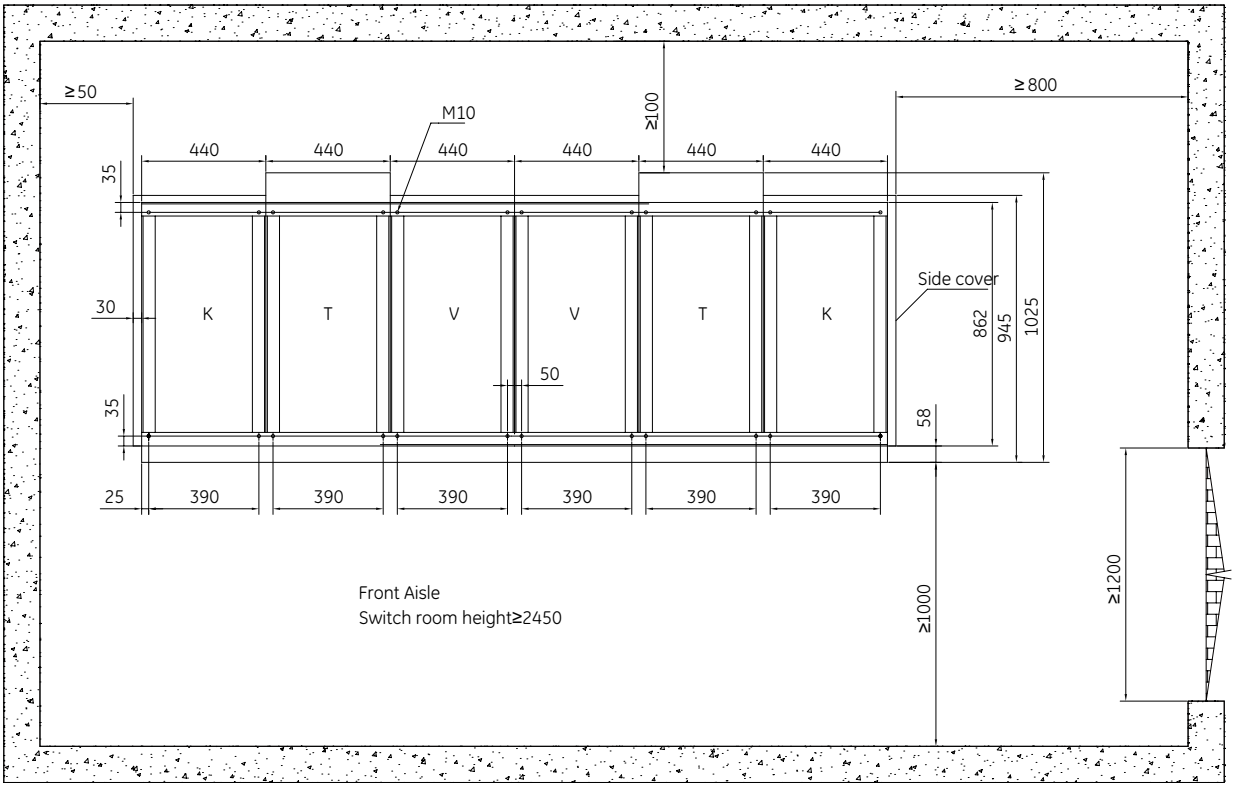


No.	Symbol	Description	Quantity
1	PR	Rectifier	1
2	M	Motor	1
3	HQ	Closing coil	1
4	TQ	Opening coil	1
5	DL	VCB aux. contact	1
6	CK1,CK2	Charging contactor	2
7	M1~7,M19	Aux. contact	8
8	ZLC	Anti-tripping module	1
9	PA PC	Push button	2
10	F1	Fuse	1
11	Q1	MCB	1
12	KK	Transfer switch	1



SecoRMU Installation Foundation

SecoRMU Layout drawing



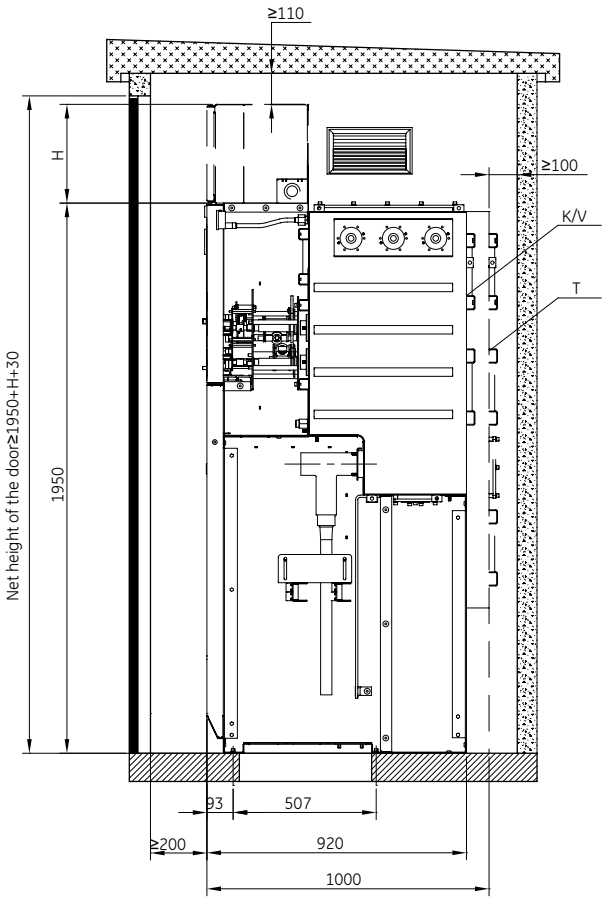
Dimension and load-bearing requirements for the switchgear room design

Panel			K	T	V
Panel width		mm	440	440	440
Installation					
Door	Width	mm	540	540	540
	Height	mm	2200	2200	2200
Switch room height		mm	2500	2500	2500
Aisle width					
Rear min. wall distance		mm	100	100	100
Front min. wall distance		mm	1000	1000	1000
Panel weight		kg	300	375	500
Min. load-breaking of the floor		Kg/m^2	800	1000	800

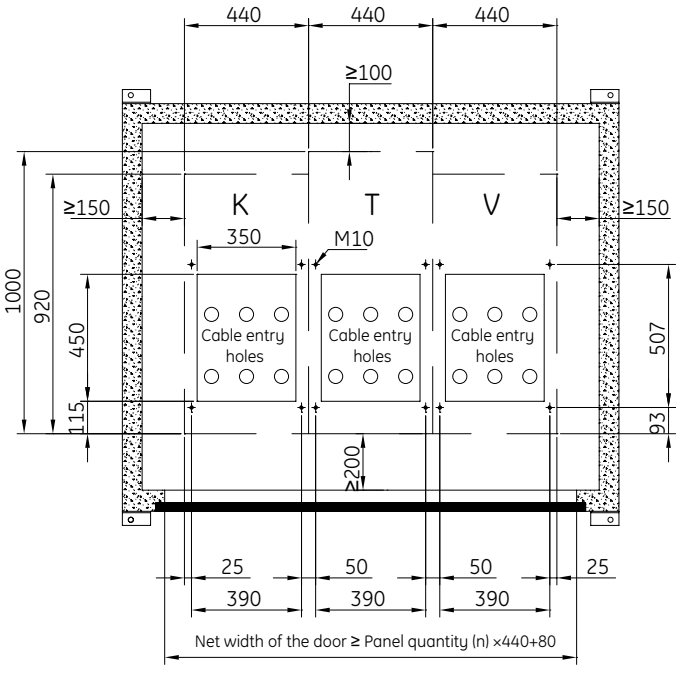
Note: Table above shows the min. dimensions required. If LV compartment is installed, the relative height should be increased accordingly.

SecoRMU Installation Foundation

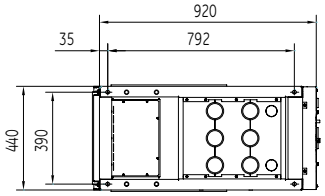
SecoRMU Outdoor Enclosure Installation

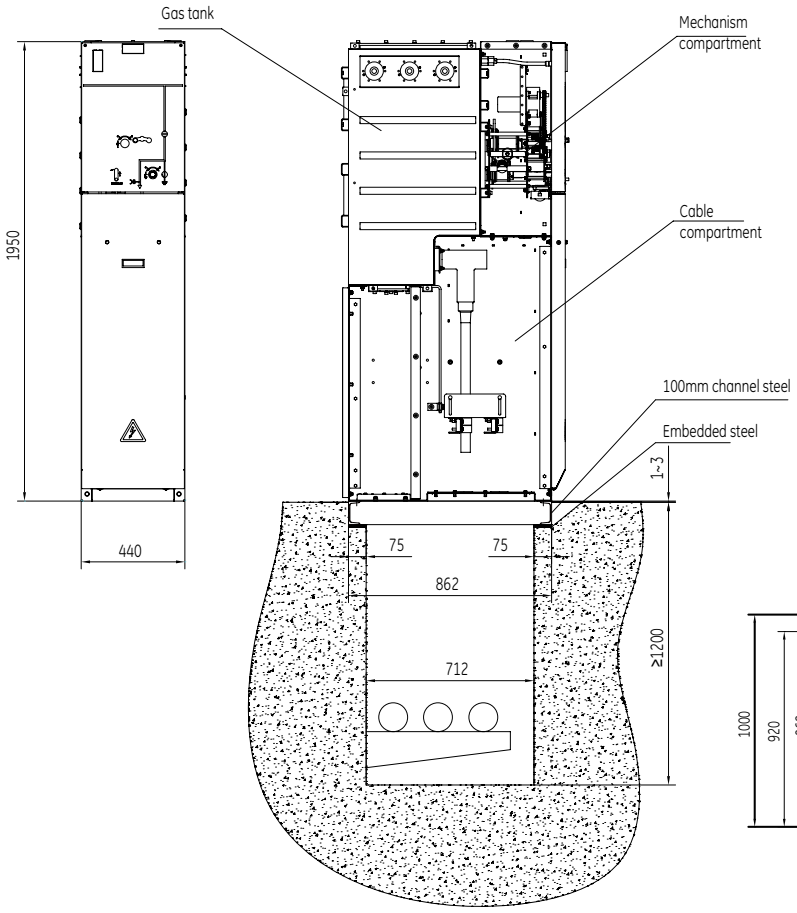


Note: SecoRMU panels should be connected together before putting into the outdoor enclosure. Can lift the panel line-up in through the top of the outdoor enclosure; or move the panel line-up in through the front door of the outdoor enclosure.

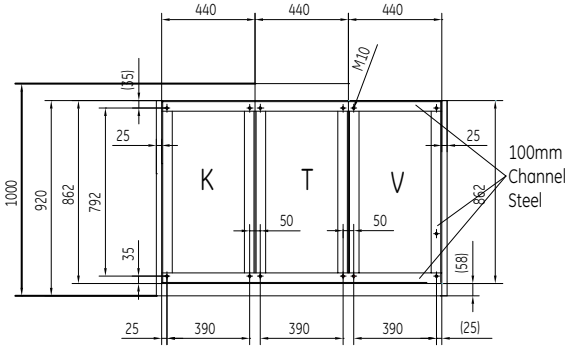


Cable Trench for SecoRMU Installation



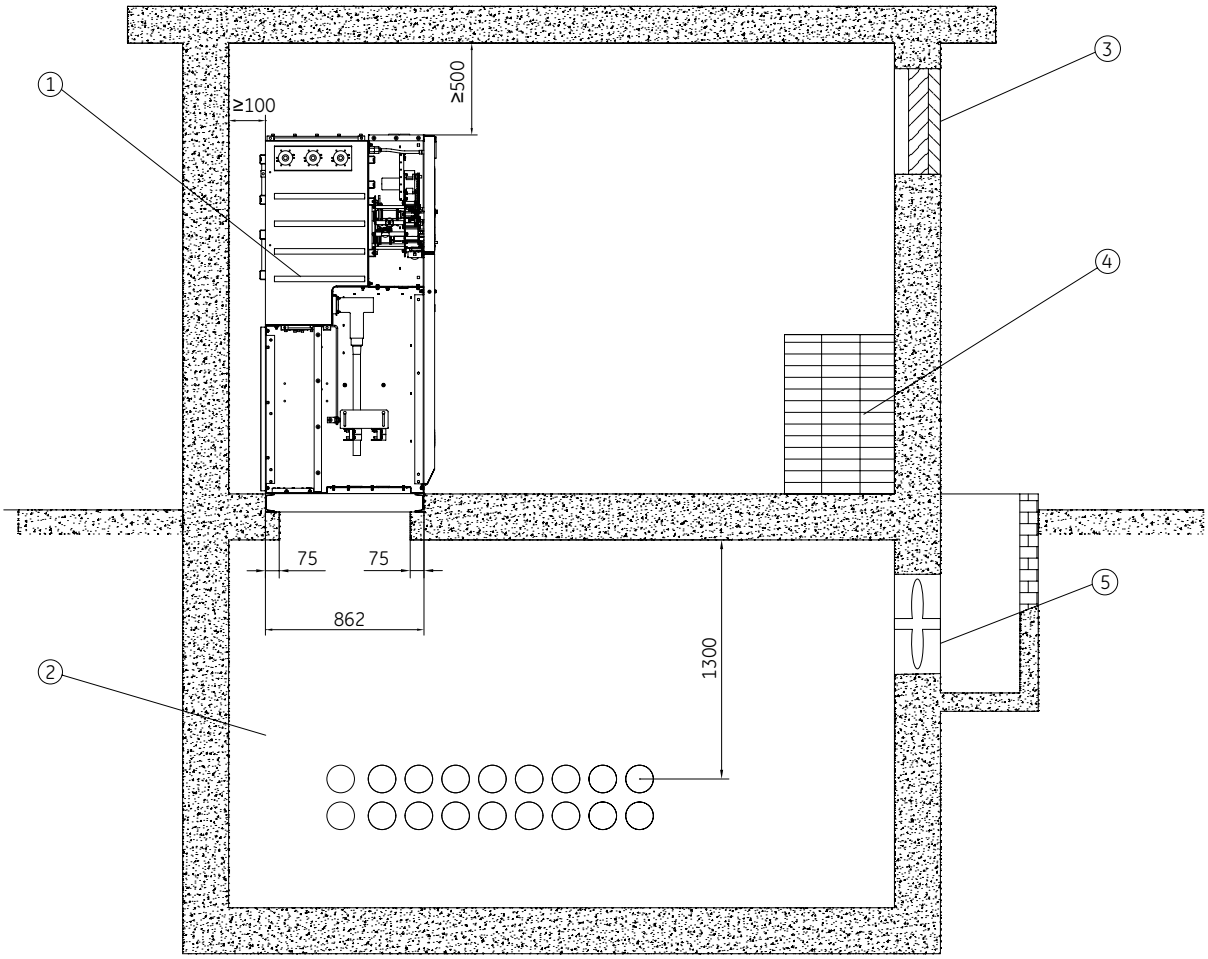


1) A foundation is made up of two pieces of 100mm channel steel (as shown below).
2) The depth of the cable trench is determined by the actual cable types, as well as meeting the requirements of the technical specifications.
3) Each ring main unit has the same width and depth, while the distance between the hole's center of two different channel steels is 872mm. The panel can be fixed on the channel steel by the spot welding process.



SecoRMU Installation Foundation

Cable Interlayer for SecoRMU Installation



1. SecoRMU switchgear
2. Cable interlayer
3. Upper ventilation device
4. Bottom ventilation device
5. Cable interlayer ventilation device

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